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In The
Supreme Court of the United States

STATE OF KANSAS,

Plaintiff,

v.

STATE OF COLORADO,

Defendant,

and

UNITED STATES OF AMERICA,

Defendant-Intervenor.

On Exceptions To The Fourth Report Of The Special Master

KANSAS' EXCEPTIONS AND BRIEF

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EXCEPTIONS TO THE FOURTH REPORT OF THE SPECIAL MASTER

The State of Kansas excepts to the recommendations of the Special Master that the Court:

1. Not appoint a river master to administer the decree in this case (Recommendation 12);

2. Calculate prejudgment interest as set forth in the Special Master's Order dated December 2, 2002 (Recommendation 1);

3. Approve Colorado's proposal to measure its Arkansas River Compact compliance over a ten-year period (Recommendation 11);

4. Rely on the local Colorado water court to quantify Colorado's credits under the Compact (Recommendation 9); and

5. Find that Colorado complied with the Compact during the period 1997-1999 (Recommendation 4).

The State of Kansas further excepts to:

6. The failure of the Special Master to make recommendations on all issues pending before him.

Respectfully submitted,

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BRIEF IN SUPPORT OF KANSAS' EXCEPTIONS TO THE FOURTH REPORT OF THE SPECIAL MASTER

QUESTIONS PRESENTED

1. Should a river master be appointed to administer the decree in this case?

2. Should prejudgment interest be applied to damages found to be due in 1985, the year in which this case was filed?

3. Is Colorado's ten-year compliance period proposal consistent with the Arkansas River Compact?

4. Should the Supreme Court rely on Colorado to determine issues critical to the enforcement of Colorado's interstate compact obligations?

5. Did Colorado comply with the Compact during the period 1997-1999?

6. Should the Special Master be directed to make recommendations on all issues pending before him?

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I. STATEMENT

A. The Arkansas River Basin

The headwaters of the Arkansas River rise on the eastern slope of the Rocky Mountains at an altitude above 14,000 feet, not far from the towns of Leadville and Aspen, Colorado. Tributaries drain a basin of 25,400 square miles in Colorado that includes Pike's Peak and the City of Colorado Springs. The river flows south and east from its headwaters, through the Royal Gorge, leaving the mountains near Canon City, Colorado and flowing eastward through the towns of Pueblo, La Junta and Lamar, Colorado, and Garden City and Dodge City, Kansas. The Arkansas River then continues through the States of Kansas, Oklahoma and Arkansas, ultimately entering the Mississippi River southeast of Little Rock, Arkansas.

There are two major reservoirs, John Martin Reservoir and Pueblo Reservoir, that have been constructed on the mainstem of the Arkansas River in Colorado. They have a total storage capacity of over 1,000,000 acre-feet, with some 650,000 acre-feet of that available for irrigation and other beneficial uses. See 1 First Report 44-45; Jt. Exh. 129, at 46; Jt. Exh. 18, ARCA Annual Report 7 (1985). Twenty-three canal systems divert from the mainstem in Colorado between Pueblo and the Kansas stateline, providing water to approximately 300,000 acres of irrigated land in Colorado. A number of private reservoirs store water offstream in Colorado. Six canal systems in Kansas divert water from the Arkansas River for the irrigation of approximately 44,000 acres in Kansas. App. to Third Report 86, col. b. There is only one reservoir in Kansas above Dodge City, an offstream reservoir, with a total storage capacity of some 3,600 acre-feet. See *Kansas*

v. Colorado, 514 U.S. 673, 675-677 (1995); 3 First Report 438 (1994).

More than a thousand large irrigation wells were drilled along the Arkansas River in Colorado after the adoption of the Arkansas River Compact. 1 Third Report 103. Groundwater pumping in Colorado increased from 15,000 acre-feet per year prior to the Compact, *Kansas v. Colorado*, 514 U.S., at 689-691, to a high of about 287,000 acre-feet per year after the adoption of the Compact. Joint Exh. 175, *cited in* Second Report 11 (1997).

B. The Arkansas River Compact

Kansas and Colorado signed the Arkansas River Compact in 1948. App. 1, at 1. In 1949, the Kansas and Colorado legislatures approved, and Congress ratified, the Arkansas River Compact. 63 Stat. 145. The Compact is found in Appendix 1 to this Brief. The adoption of the Compact followed two original jurisdiction cases in this Court, *Kansas v. Colorado*, 185 U.S. 125 (1902), 206 U.S. 46 (1907), and *Colorado v. Kansas*, 320 U.S. 383 (1943), and the recommendation of the Court that the States seek to resolve their differences by negotiation pursuant to the Compact Clause of the Constitution. 320 U.S., at 392; U.S. CONST., art. I, § 10, cl. 3.

The Compact consists of nine articles. Its primary purposes, as stated in Article I, are to "[s]ettle existing disputes and remove causes of future controversy between the States of Colorado and Kansas, and between citizens of one and citizens of the other State, concerning waters of the Arkansas River" and to "[e]quitably divide and apportion" the waters of the Arkansas River and the benefits of John Martin Reservoir. App. 1, at 2.

Article II of the Compact provides that the Compact is based on three grounds, including the opinion of this Court in *Colorado v. Kansas*, 320 U.S. 383 (1943). *Id.*, at 2-3.

Article IV-D of the Compact provides:

> "This Compact is not intended to impede or prevent future beneficial development of the Arkansas River by Federal or State agencies, by private enterprise, or by combinations thereof, which may involve construction of dams, reservoir, and other works for the purposes of water utilization and control, as well as the improved or prolonged functioning of existing works: Provided, that the waters of the Arkansas River . . . *shall not be materially depleted in usable quantity or availability for use* to the water users in Colorado and Kansas under this Compact by such future development or construction." *Id.*, at 5-6 (emphasis added).

Article V of the Compact provides the "basis of apportionment of the waters of the Arkansas River." Articles V-A through V-D apply to the operation of John Martin Reservoir. Article V-E specifies, among other things that "[t]here shall be no allowance or accumulation of credits or debits for or against either State." *Id.*, at 8.

Article VI addresses the relationship between the Compact and the administration of water within the respective States. Article VI-A(2) states:

> "Except as otherwise provided, nothing in this Compact shall be construed as supplanting the administration by Colorado of the rights of appropriators of waters of the Arkansas River in said State as decreed to said appropriators by the courts of Colorado, nor as interfering with the

> distribution among said appropriators by Colorado, nor as curtailing the diversion and use for irrigation and other beneficial purposes in Colorado of the waters of the Arkansas River." *Id.*, at 10.

Article VIII establishes and defines the powers of the Arkansas River Compact Administration (ARCA). Each State is equally represented on ARCA. There is a nonvoting federal chairman. Article VIII-D provides that "[e]ach State shall have but one vote in the Administration and every decision, authorization or other action shall require unanimous vote." *Id.*, at 12.

C. Proceedings Leading to the Special Master's Fourth Report

The State of Kansas commenced this proceeding in 1985, alleging violations of Article IV-D of the Compact. Trial commenced in 1990. The Special Master filed his First Report in July 1994. 513 U.S. 803 (1994). Both States filed exceptions to the First Report. The Court overruled all exceptions, held that Colorado had violated the Compact as a result of increased postcompact groundwater pumping in Colorado, and remanded the case to the Special Master. *Kansas v. Colorado*, 514 U.S. 673 (1995).

On remand, the Special Master held additional trial proceeding and received further briefs. He determined depletions in violation of the Compact for the years 1950-1994 to be 420,070 acre-feet. See Second Report 112. He filed his Second Report with the Court in September 1997. 522 U.S. 803 (1997). Colorado filed two exceptions to the Second Report, but the Court simply remanded the case to the Special Master for further proceedings. 522 U.S. 1073

(1998). Thereafter, the Special Master held trial on Colorado's violations for the two-year period 1995-1996 and on the remedy for Colorado's violations of the Compact from 1950 through 1994. The Special Master determined that violations had occurred in 1995 and 1996 in an aggregate amount of 7,935 acre-feet. App. to Third Report 64. The States later stipulated to the amount of money damages associated with the two years 1995 and 1996. See App. to Fourth Report 18.

The Special Master submitted his Third Report to the Court in August 2000. 531 U.S. 921 (2000). The Third Report was primarily devoted to recommendations on the remedy for past violations of the Compact by Colorado. Kansas filed one exception to the Third Report. Colorado filed four exceptions. After briefing and argument, the Court issued its Opinion on June 11, 2001. *Kansas v. Colorado*, 533 U.S. 1 (2001). In its Opinion, the Court rejected Colorado's contention that the Eleventh Amendment precluded recovery by the State of Kansas based on losses sustained by individual water users in Kansas. *Id.*, at 7-9. The Court ruled that prejudgment interest was not barred by the unliquidated nature of the Kansas claim and that interest was not otherwise prohibited as a general principle. *Id.*, at 9-12. The Court rejected Colorado's challenge to the rates adopted by the Special Master for prejudgment interest. *Id.*, at 12-13. The Court, however, sustained a Colorado exception to the extent that it challenged the award of prejudgment interest for years prior to 1985. *Id.*, at 13-16. Finally, the Court rejected Colorado's exception to the Special Master's determination of the value of crop losses attributable to Compact violations. *Id.*, at 16-21.

On remand to the Special Master, and after a concerted effort to settle the litigation, the parties prepared for the final major trial phase in the case. The main issues considered at trial included (1) how to use the Hydrologic-Institutional Model (H-I Model) to test Colorado compliance with the Compact; (2) whether any of the improvements proposed by the States for the H-I Model were appropriate; (3) whether Colorado was in compliance with the Compact during the years 1997-1999; (4) whether Colorado's Use Rules are sufficient to achieve Compact compliance in the future; (5) what monitoring and verification standards must be observed with respect to the H-I Model input data and Colorado replacement actions; (6) what the standard should be for determining Colorado replacement credits; (7) whether Colorado should require totalizing flow meters to measure groundwater pumping; and (8) whether a river master should be appointed to administer the Court's decree in this case. Also during trial, based on briefs, the Special Master considered how the Court's ruling on prejudgment interest should be applied.

D. The Fourth Report

Trial took place between June 24, 2002 and January 17, 2003. Closing briefs were submitted in February and March 2003, and the Special Master provided a draft report to the parties in August 2003. The States submitted comments in September and October, 2003. The Special Master submitted his final report to the Court in November 2003. The Fourth Report was received and ordered filed on December 8, 2003. 72 U.S.L.W. 3391 (2003).

The Fourth Report contains the Special Master's consideration of 1997-1999 Compact compliance (Section III); measurement of Colorado's well pumping (Section IV);

Colorado's 1998 irrigated acreage study (Section V); crop consumptive use in the H-I Model (Section VI); Colorado's changes to the H-I Model (Section VII); contested dry-up credits (Section VIII); prospective Compact compliance modeling (Section IX); measuring Compact compliance (Section X); continuing jurisdiction and request for a river master (Section XI); and recommendations (Section XII). The Appendix to the Fourth Report is composed of 15 exhibits that include trial exhibits, the order of the Special Master on prejudgment interest, the stipulation of the States for damages for the 1995-1996 Compact violations, and other documents.

II. SUMMARY OF ARGUMENT

The central standard for Compact compliance that has been developed over the course of the litigation is the Hydrologic-Institutional Model. Annual updating of the H-I Model will be necessary in order to assess the effect of Colorado's postcompact pumping and to represent properly Colorado's annual changes in the sources and amounts of replacement water to offset depletions to usable flow. Inevitably, disagreements will arise. The resolution of such disagreements could be far more efficiently resolved by a river master appointed by the Court than by a series of original actions. As proposed by Kansas, the appointment of a river master would be entirely consistent with the precedents of the Court, particularly *Texas v. New Mexico*, No. 65, Original.

The Court has determined that prejudgment interest shall be applied to Kansas' damages for Colorado's violation of the Arkansas River Compact, but only from the year in which this litigation was initiated, 1985. When the Court made that determination, it did not specify

whether prejudgment interest should be applied to the amount of damages owing at the time of the filing, or whether it should apply only to damages accruing thereafter. The evident intent of the Court's ruling, however, was to protect the value of Kansas' claim during the pendency of the litigation. If prejudgment interest is not applied to the value of the Kansas c' 'm owing in 1985, this purpose will not be accomplished.

The Special Master has recommended a ten-year compliance accounting period using the H-I Model for purposes of assessing Colorado's compliance with the Arkansas River Compact. If accepted, this recommendation would significantly reduce Kansas' rights under the Compact. After more than 15 years of work by the parties in the course of this litigation, the H-I Model has been accepted by the parties and the Special Master as the best tool to determine Compact compliance. See Fourth Report 109. It may be subject to some uncertainty, but how much uncertainty is unknown. There is no bias in the uncertainty of the H-I Model, and it constitutes the best method available to effectuate the agreement of the States in allocating the waters of the Arkansas River on an annual basis. In fact, the model has been applied annually throughout this litigation. Therefore, until a better method becomes available to effectuate the States' agreement, the H-I Model results should be used on an annual basis to determine the allocation between the States and to enforce the Court's interpretation of the Compact.

The Special Master's recommendation that the Court rely on Colorado to determine issues raised by this litigation is inconsistent with the Constitution and the decisions of this Court. See U.S. CONST., art. III, § 2; *West Virginia ex rel. Dyer v. Sims*, 341 U.S. 22 (1951). This Court

provides an impartial forum, in which the States are participants and may resolve their controversies. The disputes pending presently before this Court for resolution can be resolved by the Court with the assistance of the Special Master. Matters arising under the decree in this case can be resolved impartially by a river master appointed by the Court. Both present and future controversies between the States should be resolved by this Court, not by a Colorado state water court.

The Special Master's conclusion that Colorado had complied with the Compact during the years 1997-1999 was predicated on allowing accretions and depletions to be offset against each other over a period of three years. This is consistent with the Special Master's recommendation that a ten-year accounting period be adopted with respect to measuring Colorado's Compact compliance. For the same reasons that Colorado's ten-year accumulation of accretions and depletions is untenable, this three-year period is also untenable.

The Special Master has declined to rule on certain pending issues. He appears to have recommended that these issues be decided either by the Colorado water court or by this Court in the future. For reasons stated above, these issues, to the extent that they are susceptible of current determination, should be determined now. To the extent that they become issues in the future, in the course of the implementation of the Court's decree in this case, they should be assigned to a river master appointed by the Court.

III. ARGUMENT

A. A River Master Should Be Appointed to Enforce the Decree and to Avoid the Need for a Series of Original Actions.

1. Introduction

The H-I Model has become a necessary element of the enforcement of the Arkansas River Compact with regard to postcompact pumping in Colorado. The Court has held that such pumping caused violations of the Compact. The States have stipulated to the amount of violations in acre-feet for each year from 1950 through 1985. Second Report 11; Jt. Exh. 178. The Special Master has recommended, without exception from Colorado, that the Compact violations for the years 1986-1994 and 1995-1996 are 91,565 acre-feet and 7,935 acre-feet, respectively. Second Report 46; App. to Third Report 64; Jt. Exh. 183. All of these quantifications are based on the H-I Model. The Special Master has ruled that postcompact pumping is not a Compact violation per se and has refused to grant a motion for injunction filed by Kansas at an earlier stage of this litigation. App. to Second Report 12-25. Colorado has persisted in its efforts to utilize postcompact wells for agricultural purposes, and this has necessitated a quantification of the effects of such pumping on Colorado's Compact obligations. Therefore, use of the H-I Model will continue to be necessary for the foreseeable future.

Following the precedent of *Texas v. New Mexico*, 482 U.S. 124, 134 (1987), on the Pecos River, Kansas recommended that the Court appoint a river master to administer the decree in this case. In the Pecos River case, the Court appointed a river master, citing the "natural propensity of these two States to disagree if an allocation

formula leaves room to do so." The Court expressed concern that it would face a "series of original actions" absent some disinterested authority to make determinations binding on the parties. *Ibid.*

The Kansas proposal follows the example of the Pecos River Master in most respects. Thus, an Arkansas River Master would be appointed by the Court to administer the decree intended to assure future compliance. The River Master would have no authority to resolve Compact disputes between the States outside the scope of the decree. Rather, he or she would resolve disputes arising in the implementation of the decree. Application of the H-I Model, something that both States agree is necessary for the determination of Compact compliance, will be necessary on a yearly basis. The Special Master has proposed that the H-I Model be operated annually. Fourth Report 117. As a result, new hydrologic data will need to be collected and analyzed each year and prepared for input to the H-I Model. As the Fourth Report illustrates, the States continue to have "serious disagreements" about matters related to H-I Model updating "both as to data input and model coding." Fourth Report 121.

In conformance with the procedures adopted during the litigation, the States would be responsible for collecting the data, running the H-I Model and proposing any modifications to the H-I Model that one or both of the States considered appropriate or necessary. Matters on which the States could not agree would then be brought before the River Master for independent determination. Review would be possible by the Court under a clearly erroneous standard. The River Master's fees and expenses would be shared by the States. The Pecos River Master's fees are submitted quarterly and over the period since his

initial appointment have averaged approximately $12,000 per year. *Texas v. New Mexico*, 485 U.S. 388, 394 (1988).[1]

The Special Master declined to support the Kansas recommendation that a river master be appointed. See Fourth Report 125-136, 139. The factors considered by the Special Master in reaching this conclusion appear to have been whether the appointment of a river master would be to continue the litigation indefinitely; whether the function would be largely ministerial or would involve judgment; the similarities and dissimilarities between this case and the Pecos River litigation; whether it is practical for a river master to resolve disputes over the H-I Model; whether the Court precedents support the appointment of a river master; and the settlement of two interstate water disputes in the last several years. Fourth Report 125-135.

2. Appointment of a River Master is as Appropriate on the Arkansas as on the Pecos.

Kansas believes that a river master is necessary to bring this litigation to effective closure and to implement the decree of the Court in this case because the H-I Model, which is the standard for determining compliance under the Compact, requires annual updating and may need to be modified. The States will prepare annual updates based on the most recent data, new computer runs of the H-I

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[1] The River Master's fees and expenses have ranged from a high of about $34,000 in 1992 to a low of about $5,000 in 2000. See *Texas v. New Mexico*, 504 U.S. 954 (1992); 506 U.S. 938 (1992); 506 U.S. 983 (1992); 507 U.S. 904 (1993); 530 U.S. 1212 (2000); 531 U.S. 921 (2000).

Model and analysis of the results of those runs. The States have often disagreed about the annual updating of the H-I Model. In the most recent update, initially intended for the two years 1997-1998, later extended to include 1999, the States disagreed on many issues. The States vigorously disputed, among other things, irrigated acreage (both total acreage and acreage in each canal area), supplemental acreage (acreage served by both surface and groundwater), dry-up credit inputs to the H-I Model, quantification of replacement credits outside the H-I Model, and calculation of potential evapotranspiration. Fourth Report 24-26.

A procedure is needed to resolve these ongoing disagreements over the implementation of the Special Master's recommended method for determining Compact compliance. The Colorado water courts do not have jurisdiction to enter judgments binding on the State of Kansas. See *Hinderlider v. La Plata River & Cherry Creek Ditch Co.*, 304 U.S. 92, 103 (1938). Nor, in this case, do the federal district courts, 28 U.S.C. § 1251(a); *Mississippi v. Louisiana*, 506 U.S. 73 (1992). This Court is the only court with the requisite jurisdiction. *Ibid.* Thus, a series of original actions to resolve these issues can be anticipated, placing an unnecessary burden on the Court and on the States unless a river master is appointed.

The most recent instance in which the Court has considered the appointment of a river master was the litigation between Texas and New Mexico over the interpretation and enforcement of the Pecos River Compact. *Texas v. New Mexico*, 482 U.S. 124, 134-135 (1987). In that case, the Court appointed a river master, saying, "[w]e are quite sure that our jurisdiction over original actions like this provides us with ample authority to appoint a master and to enforce our judgment." *Ibid.* Indeed, the Court

referred to the ongoing operation of the river master on the Pecos River in the recent oral argument on the Potomac River dispute. *Virginia v. Maryland*, No. 129 Orig., Oral Arg. Tr. 36 (Oct. 7, 2003) ("In fact, in the Texas against New Mexico case, . . . there's a river master on the Pecos River, operating under one of our decrees").

The Special Master acknowledged that there are "remarkable similarities" between the situation on the Pecos River and the present situation on the Arkansas River. Fourth Report 125. The Special Master pointed out that both cases involve interstate compacts; both Compacts establish commissions to administer them; commission action requires unanimous agreement; allocation of streamflows is made on the basis of precompact conditions without designating a specific quantity of water; and both cases have resulted in the Court finding compact violations of roughly similar magnitude (in the range of 10,000 acre-feet per year). See Fourth Report 125-126.

The Special Master pointed, however, to some differences that he saw between the Arkansas River and Pecos River situations.[2] He first pointed out that the Court had received a recommendation from the Special Master in the *Texas v. New Mexico* litigation that might lead to repayment in water, which would have been in addition to

[2] One important difference between the Pecos River and Arkansas River situations that was not mentioned by the Special Master relates to the existence of storage facilities in the downstream state. Kansas has essentially no downstream storage, whereas Texas has substantial storage at the stateline in the form of Red Bluff Reservoir. See *Texas v. New Mexico*, Special Master Report 18-19 (1979); 462 U.S. 554, 556 n.1 (1983).

determining ongoing compliance. *Id.*, at 126-127. He noted that, in the present case, past shortages are to be compensated by money damages, suggesting that such a difference supports not appointing a river master in this case. *Ibid.* Although the Special Master notes that the remedy for the past shortages on the Pecos River was later settled as a money judgment, *id.*, at 127 n.21, he does not point out that, even with the removal of any possibility that the River Master might be asked to make calculations with respect to repayment of past shortages in water by entry of a money judgment, the Court has maintained the appointment of the Pecos River Master to this day.[3] See, *e.g.*, *Texas v. New Mexico*, 502 U.S. 803 (1991) (awarding River Master fees and expenses and denying motion of New Mexico to review River Master's final annual report); 124 S.Ct. 460 (2003) (awarding River Master fees and expenses).

In *Texas v. New Mexico*, the Court, in its explanation of the reasons for appointing a river master, stated that the Special Master had recommended a river master "because applying the approved apportionment formula is not entirely mechanical and involves a degree of judgment." 482 U.S., at 134. In analyzing this issue, the Special Master in the present case relied on the 2002 Report of the Pecos River Master, which was before him as Colorado Exhibit 1407 and is included in the Appendix to

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[3] On October 15, 1991, more than a year and a half after the entry of the stipulated money judgment, the Court confirmed and supplemented its order appointing the River Master by readopting the appointment order with an additional allowance for the cost of "competent legal advice deemed by him to be necessary to carry out his duties." *Texas v. New Mexico*, 502 U.S. 903 (1991).

the Fourth Report. App. to Fourth Report 87. The Special Master said, "It is not clear from this Report, however, how much judgment may be required in preparing the River Master's annual accounting, and indeed whether or not his duties are essentially ministerial as argued by Colorado." Fourth Report 127.

First, since Colorado Exhibit 1407 simply lists the results of the Pecos River Master's analysis, one would not expect the degree of judgment exercised to be apparent. Second, it appears that this Court's understanding in 1987 that the Pecos River Master's duties would include "a degree of judgment" was correct. This is shown by the Pecos River Master's Manual itself, which is attached to this brief as Appendix 2.[4] Inevitably, disagreements arise over the quality and analysis of data. See, *e.g.*, App. 3 hereto; App. to Fourth Report 102-105. In addition, the Pecos River Master's Manual directs the River Master to "select flood inflows by inspection of daily data" with respect to one of the tributaries of the Pecos River. App. 2, at 39. Thus, the River Master must rely on his own judgment to separate flood inflows from base flows. See App. 3, at 54 ("judgement normally will be required"), 56.

The River Master is also directed to adjust computed departures in the Compact compliance computations by

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[4] The original Pecos River Master's Manual was introduced into evidence in this case as Kan. Exh. 1104. Kan. Exh. 1104 does not contain the Manual appendices, nor does it include changes in the Manual by the River Master since 1988. See, *e.g.*, Appendices 3 and 4 to this Brief. For ease of reference, Appendices 3, 4 and 5 to this Brief, all documents from the official records of the Court or the Court's Pecos River Master, are being forwarded to the Clerk of the Court and the parties together with a certificate of authenticity.

applying certain factors, including adjustments for salvage water in New Mexico and unappropriated flood waters. App. 2, at 23. The River Master is directed to "study" certain water salvage projects and "[d]etermine the amount of water salvaged." *Id.*, at 48. No criteria for determining the amount of water salvaged is provided. Further, "[t]he River Master shall determine and apportion any unappropriated flood waters using methodologies not inconsistent with applicable provisions of the Compact and this Manual." *Ibid.* Determining whether a methodology is not inconsistent with the Pecos River Compact and the Pecos River Master's Manual requires the exercise of considerable judgment in interpreting those documents.

The foregoing discussion demonstrates that the Pecos River Master is required to use a fair degree of judgment in quantifying tributary flood waters, salvaged water and unappropriated flood waters, all of which are components of the calculation of New Mexico's obligations to deliver water at the stateline.

As the Special Master acknowledges, the Pecos River Master even has the authority to modify the Pecos River Master's Manual itself, subject to review on clearly erroneous grounds by the Court. Fourth Report 129. The exercise of "a degree of judgment" by the Pecos River Master would clearly be required in such an instance.[5] The

[5] Special Master Charles J. Meyers in the Pecos case predicted the degree of judgment to be exercised by the Pecos River Master as follows: "The need for sound judgment will arise when one party seeks to modify the Manual without the concurrence of the other party. . . . For the most part, these proposed changes are likely to raise technical issues of hydrology or statistics, as to which the River Master will have expertise." App. 5, at 93-94.

Special Master states, however, that there is no evidence – contrary to assertions by Kansas – that the Pecos River Master has authority to "'change the quantitative standard for delivery of water at the stateline [which] is essentially the same function as performed by the H-I Model.'" *Id.*, at 129-130 (quoting Kan. Comments on Draft Fourth Report).

Section III-C of the Pecos River Amended Decree is entitled "Modification of Manual" and provides for modification upon agreement of the parties or by the River Master in response to a motion of one of the parties. 485 U.S. 388, 392 (1988). Final determinations of the River Master are subject to review by this Court, but "only on a showing that the final determination is clearly erroneous." *Id.*, at 393. And on page 1 of the Pecos River Master's Manual, Kan. Exh. 1104, an equation showing the index outflow is set out, with the statement, "This equation will be used to determine New Mexico's 1947 condition delivery obligation imposed by the Pecos River Compact." App. 2, at 22. This is "the approved apportionment formula," which "is not entirely mechanical and involves a degree of judgment." 482 U.S., at 134. Therefore, when the opening provisions of the Pecos River Master's Manual are compared to this Court's Amended Decree, it becomes clear that the Pecos River Master has the authority, on the motion of one or both of the States and subject to review, to modify the quantitative standard for delivery of water at the stateline on the Pecos River.

Further, there *is* evidence in this case that the quantitative standard for delivery of water at the stateline in the Pecos River Master's Manual "is the same function as performed by the H-I Model" in this case. We have already seen that the Pecos River Master's Manual

contains the quantitative standard for delivery of water at the stateline on the Pecos River. The H-I Model in this case is the quantitative standard for delivery of water at the stateline on the Arkansas River pursuant to the earlier rulings of the Special Master and this Court. See, *e.g.*, Fourth Report 121 ("Both states are bound, at least for now, to the use of the [H-I] Model to determine whether or not there are compact shortages at the Stateline"); *id.*, at 52 ("The H-I Model is designed, insofar as feasible, to replicate actual conditions and on that basis to calculate depletions of usable stateline flows").

The Special Master also asserts that there is no evidence that the Pecos River Master has ever changed the manual. *Id.*, at 130. Subsequent investigation of the records of the Supreme Court, in light of the Special Master's concern, shows that the Pecos River Master has changed the Pecos River Master's Manual. See Apps. 3 and 4 hereto. But knowing whether the Pecos River Master has ever exercised the most far-ranging "degree of judgment" authorized by the Amended Decree in *Texas v. New Mexico* is not necessary to a determination of whether the Pecos River Master has the authority to do so. He clearly has that authority.[6]

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[6] The Special Master, in the text of his discussion of the River Master issue, recommends that, in the future, original actions in this Court by either Kansas or Colorado to enforce the Compact not be accepted unless the dispute has first been taken to the Arkansas River Compact Administration. Fourth Report 136. A similar recommendation was made by the Special Master in *Oklahoma v. New Mexico*, No. 109, Orig., 501 U.S. 221 (1991). The Special Master in that case "recommended that the Court use this case to articulate various jurisdictional prerequisites and procedural guidelines for application in future

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3. Precedents Other Than the Pecos River Case Also Support Appointment of a River Master.

The Special Master points to the Delaware River litigation as the other example of the appointment of a river master. Fourth Report 130. *New Jersey v. New York*, 347 U.S. 995 (1954), to which the City and State of New York, the State of New Jersey, the Commonwealth of Pennsylvania and the State of Delaware were parties, resulted in the appointment by the Court of a river master, following an earlier denial without prejudice of a request for such an appointment. *New Jersey v. New York*, 283 U.S. 805 (1931). The appointment of the Delaware River Master by the Court has been complemented by the subsequent adoption of the Delaware River Basin Compact, 75 Stat. 688 (1961), and the Delaware River Master has continued to perform a vital function in the implementation of the Court's decree from 1954 to the present day.

The Special Master correctly questions a later assertion that the Delaware River Master performs "only ministerial acts." Fourth Report 130. The 1954 decree of the Court suggests that judgment is required in a number of the River Master's duties. For instance, the Delaware

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interstate compact litigation." *Id.*, at 228-229. The Court gave as an example the Special Master's recommendation that States certify that they had negotiated in good faith in an attempt to resolve the dispute without resort to the Court. *Id.*, at 229 n.3. The Court rejected the Special Master's recommendation, however, stating, "[W]e decline the Master's invitation to set forth prerequisites and guidelines, beyond those already in existence, for invoking this Court's original jurisdiction." *Id.*, at 241 n.11. Accordingly, Kansas objects to this recommendation by the Special Master in this case.

River Master is required to perform his duties with respect to certain reservoir releases "by appropriate observation and estimates." 347 U.S., at 1003.

Given the modeling and data analysis that will be necessary in the implementation of this Court's decree on the Arkansas River, it may be that more judgment is required on the Arkansas than on the Delaware, which, if true, is all the more reason to appoint a river master on the Arkansas and not leave implementation of the decree to a series of original actions.

The Special Master cites the case of *Wisconsin v. Illinois*, 281 U.S. 179 (1930), as a case "in which a request for a River Master or some type of continuing enforcement authority has been denied." Fourth Report 130. In that case, Justice Holmes, speaking for the Court, chose between two options suggested by the Special Master: (1) appointment of a commission to supervise the construction work ordered or (2) requirement of periodic filing with the Clerk of the Court of progress reports. The Court chose the second option, which arguably required more attention from the Court. Any of the parties were allowed to apply to the Court for action in response to the semiannual reports. *Wisconsin v. Illinois*, 281 U.S., at 201-202. Under these circumstances, it may be somewhat of an overstatement to describe the Court as having denied a request for a river master or some type of continuing enforcement authority. Indeed, in *Texas v. New Mexico*, 482 U.S. 124 (1987), the Court cited *Wisconsin* as an occasion in which the Court appointed an agent or functionary or employed a like solution to implement its decree. See *id.*, at 134.

The Special Master discusses the case of *Wyoming v. Colorado*, 298 U.S. 573 (1936), and states that the Court

"refused to appoint a water master to keep the records" of diversions. Fourth Report 131. There does not appear, however, to be any mention of a river master or like authority in the Court's discussion. See *Wyoming v. Colorado*, 298 U.S., at 585-586. Rather, the Court accepted Colorado's assurances of cooperation with Wyoming as the basis for denying a Wyoming request that the State of Wyoming be allowed to install its own measuring devices in Colorado. See *ibid.*

Thus, the only case cited by the Special Master in which a river master or some type of continuing enforcement authority has been denied is *Vermont v. New York*, 417 U.S. 270 (1974) (*per curiam*). That case involved a complaint by Vermont alleging water pollution, impedance of navigation and creation of a public nuisance by the State of New York in Lake Champlain and Ticonderoga Creek. The parties reached a settlement part way through trial before the Special Master. *Id.*, at 270-271. The Court considered and rejected the request of the parties that the Court appoint a "South Lake Master." There are decisive differences, however, between the *Vermont* case and this case. In this case, there is an interstate compact that the Court has interpreted so as to quantify the allocation of the waters of the Arkansas River between the States of Colorado and Kansas. In *Vermont* there was no compact. Nor was there was a quantitative determination of the respective rights of the States. The Court pointed out that "no findings of fact have been made; nor has any ruling been resolved concerning . . . equitable apportionment of the water involved." *Id.*, at 276. The Court further pointed out that "[t]he proposals submitted by the South Lake Master to this Court might be proposals having no relation to law." *Id.*, at 277.

There is no danger of such proposals being made by a river master appointed by the Court to administer the decree in this case. Here, the river master would not make proposals, but would make determinations in response to submittals by the two States, and he or she would be limited strictly to interpreting and implementing the decree entered by the Court. The considerations that caused the Court to deny a "South Lake Master" in *Vermont v. New York* therefore do not exist in this case.

The Special Master points to the recent settlement of two interstate water cases, one of which involved the States of Kansas and Colorado. Fourth Report 132-135, citing *Nebraska v. Wyoming*, No. 108, Orig., 534 U.S. 40 (2001); *Kansas v. Nebraska*, No. 126, Orig., 123 S.Ct. 1898 (2003). The settlement of some interstate issues, however, should not affect the relief approved in a contested case or lead the Court to suppose that issues that could not be settled in the Arkansas River Basin in the past can somehow be expected to be settled in the future. Indeed, the States have been demonstrably unable to resolve their major differences despite earnest efforts on both sides to do so. The most recent formal effort was in the fall of 2001. The States reported to the Special Master at the conclusion:

> "3. Unfortunately, despite the excellent services of the Mediators and the considerable efforts of the States, including extensive personal involvement of the Attorneys General themselves, it has not been possible to settle the remaining issues in the case at this time. The States, however, intend to continue to consider the possibility of settlement, especially upon completion of the final expert reports and related discovery." Joint Report of the States, App. to Fourth Report 23-24.

As the 2002-2003 trial segment shows, the parties were unable to settle the major issues dividing them.

Justice White, writing for a unanimous Court in *Oklahoma v. New Mexico*, 501 U.S. 221 (1991), rejected the Special Master's recommendation that an issue before the Court be referred to the Canadian River Compact Commission for "good-faith negotiations and possible resolution." *Id.*, at 228, 240-241.[7] Justice White wrote:

> "It is true that the Court has often expressed [a] preference that, where possible, States settle their controversies by mutual accommodation and agreement, but the Court does have a serious responsibility to adjudicate cases where there are actual, existing controversies between the States over the waters in interstate streams." *Id.*, at 241 (citations and internal quotation marks omitted).

Thus, while it is to be earnestly hoped that many controversies between Kansas and Colorado with respect to the implementation of the decree in this case will be settled by mutual accommodation and agreement, the Court has affirmed its responsibility to assure that it provides for the resolution of disputes that cannot be settled. The recent settlements, including No. 126, Original, are to be commended, but given the history of the two States on the Arkansas River, and the significant difference between the Compacts,[8] it cannot reasonably be presumed that

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[7] Although there was a dissent with respect to other issues, the Court was unanimous on this point.

[8] For instance, under the Republican River Compact, an acre-foot allocation is made to the three States. Two of the States are both

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disputes will abruptly stop after more than a century of intermittent but continual disputes between the two States. See *Kansas v. Colorado*, 185 U.S. 125 (1902); *Colorado v. Kansas*, 320 U.S. 383 (1943).

4. Conclusion

A degree of judgment will be necessary in the implementation of the decree in this case. Therefore, the disputes that will inevitably arise between the States should be handled in the first instance by a river master appointed by the Court rather than by the Court directly. The Special Master is justly concerned that this litigation not continue indefinitely in its present form. Kansas' proposal will accomplish this goal by securing the entry of a specific decree and the handling of such disputes that do arise under the decree by a river master whose determinations would be reviewable by the Court, if necessary, under the clearly erroneous standard. In short, to the extent that there are disputes under the decree, it is far more efficient for the Court and the States if those disputes are handled by a river master rather than by the Court directly.

B. Prejudgment Interest Should Begin to Accrue in 1985 on the Damages Existing at That Time.

1. Introduction

The Court decided in its Opinion of June 11, 2001, that prejudgment interest should "begin to accrue" in

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upstream and downstream States. Neither of these elements occurs in the Arkansas River Compact.

1985, the year in which Kansas filed its complaint in this action. *Kansas v. Colorado*, 533 U.S. 1, 15 (2001). The Court did not address, however, whether the interest should accrue on damages that Kansas had incurred as of that date, or whether it should accrue only on damages that Kansas would incur *after* that date. The Special Master has read the Court's Opinion in the latter sense. In an Order on December 2, 2002, the Special Master concluded:

> "I believe the Court intended to exempt all damages occurring before the suit was filed from any prejudgment interest (not including an adjustment for inflation.) Prejudgment interest should apply *only* to those damages occurring after filing suit, i.e., after 1985." App. to Fourth Report 14 (emphasis in original).

In his Fourth Report, the Special Master has recommended that interest be calculated in the manner specified in that Order. Fourth Report 137, ¶ 1. Believing that the Special Master has misconstrued the Court's Opinion in this regard, Kansas excepts to the Special Master's recommendation.

2. Procedural Background

The Court's Opinion of June 11, 2001, resolved several issues relating to the award of prejudgment interest. The unliquidated nature of Kansas' damages claim does not pose a categorical bar to such an award. 533 U.S., at 9-12. Interest should be awarded at the rates recommended by the Special Master in his Third Report. *Id.*, at 12-13. Finally, in regard to the accrual of interest on Kansas' damages, the Court ruled on three different positions:

(1) Kansas had argued that prejudgment interest should accrue from the time of its losses, beginning in 1950, in order to afford it full compensation. The Court rejected Kansas' argument, holding that "the equities in this case do not support an award of prejudgment interest from the date of the first violation of the Compact, but rather favor an award beginning on a later date." *Id.*, at 14.

(2) The Special Master had recommended in his Third Report that interest should accrue from 1969, when Colorado knew or should have known that it was violating the Compact. Third Report 103-107. He further recommended that Kansas' damages incurred in the years 1950-1968 should be adjusted for inflation "but should not bear compound interest reflecting the loss of use of those monies." *Id.*, at 107. The Court rejected the Special Master's recommendation on this point, ruling that interest should begin to accrue at a later date advocated by Colorado. 533 U.S., at 15-16 & n.5.

(3) Colorado had argued that interest should not begin to accrue until 1985, the date of the filing of Kansas' complaint. The Court agreed, sustaining Colorado's exception to the Third Report "insofar as it challenges the award of interest for the years prior to 1985." *Id.*, at 16. In so ruling, the Court did not state whether interest accruing after the filing of the complaint in 1985 should be computed on the damages then existing and unpaid, or whether it should be computed only on such damages as first arose after the filing of the complaint. See *id.*, at 15-16 & n.5.

After the Court issued its June 11, 2001 Opinion, a disagreement arose between the States regarding the correct interpretation of the Opinion. In particular, the

States differed over whether the Court intended that prejudgment interest should accrue on Kansas' damages owing as of its filing of suit in 1985, or only on such damages as it incurred *after* filing suit. The States submitted briefing on this issue, and the Special Master ruled on the matter on December 2, 2002. As stated above, the Special Master believed that the Court had intended to "exempt" all damages incurred before the filing of suit from any prejudgment interest, except for an inflation adjustment. He thus found that interest should accrue only on damages incurred after the filing of suit. App. to Fourth Report 14.

3. Prejudgment Interest Should Begin to Accrue in 1985 on Kansas' Damages Then Owing.

At issue is what the Court intended when it ruled that "after examining the equities for ourselves, . . . a majority of the Court has decided that [1985] is the more appropriate" date at which interest should begin to accrue. 533 U.S., at 15 & n.5. The Court clearly intended that interest should begin to accrue on Kansas' damages only from the year in which Kansas filed its complaint. What the Court did not address is whether it intended (1) that interest should accrue on the damages owing at that time, or (2) that interest should accrue only on damages later incurred. See *id.*, at 13-16.

Although the Court's Opinion itself does not directly answer the question, both law and logic point to a single reasonable interpretation. For well over a century, the Court has ruled consistently that prejudgment interest accrues on the damages then owing: "If a debt ought to be paid at a particular time, and is not, owing to the default of the debtor, the creditor is entitled to interest from that

time by way of compensation for the delay in payment." *Young v. Godbe*, 82 U.S. (15 Wall.) 562, 565 (1873). In *Funkhouser v. J.B. Preston Co.*, 290 U.S. 163 (1933), the Court observed that "the injured party has suffered a loss which may be regarded as not fully compensated *if he is confined to the amount found to be recoverable as of the time of breach* and nothing is added for the delay in obtaining the award of damages." *Id.*, at 168 (emphasis added). Adjustment for inflation aside, the Special Master's recommended resolution would confine Kansas to the amount found to be recoverable as of the time of breach for all damages incurred in the years 1950-1984. Nothing would be added for the delay from 1985 to the date of judgment in obtaining those damages. See *ibid.*

Colorado signed the Arkansas River Compact in 1948. App. 1, at 1. The Court's decisions make clear that by that time there was nothing controversial about the proposition that prejudgment interest should be applied to the damages owed as of the date that interest begins to accrue. See 533 U.S., at 10-12 & n.4, 14 (finding that when Colorado signed the Compact it "was on notice that it might be subject to prejudgment interest if such interest was necessary to fashion an equitable remedy"). Today, of course, that proposition remains uncontroversial. See *Milwaukee v. Cement Div., National Gypsum Co.*, 515 U.S. 189, 196 (1995) (noting that prejudgment interest serves to compensate "'for the loss of use of money due as damages from the time the claim accrues until judgment is entered'") (quoting *West Virginia v. United States*, 479 U.S. 305, 310-311, n.2 (1987)).

The Court did not suggest that any portion of Kansas' damages should be exempt from interest once it begins to accrue. Rather, it ruled that "the equities in this case do

not support an award of prejudgment interest from the date of the first violation of the Compact, but rather favor an award *beginning on a later date*." 533 U.S., at 14 (emphasis added). The Court determined that "considerations of fairness," rather than a "rigid theory of compensation for money withheld," were appropriate in arriving at such an award. *Id.*, at 13-15. It cited with approval the specific considerations identified by the Special Master in support of its conclusion that interest should not begin to accrue until 1985.

But these same considerations of fairness support a determination that interest *should* begin to accrue in 1985 on the damages that Colorado then owed to Kansas. Thus, the Court agreed with the Special Master that interest should not accrue in the early years from 1950 forward, when "no one had any thought that the pact was being violated." 533 U.S., at 14. In contrast, by the time Kansas filed suit in 1985, no one could claim ignorance. In fact, the Special Master found that Colorado knew or should have known some 17 years earlier, by 1968, that it was violating the Compact. Third Report 103. The Court did not disturb that factual finding although it determined that interest should not begin to accrue at the earlier date. See 533 U.S., at 15, n.5.

Similarly, the Court agreed with the Special Master that there was a "long interval that passed between the original injuries and these proceedings." *Id.*, at 14. In contrast, there was no interval at all between 1985 and these proceedings, and this is true precisely by reason of the Court's determination that interest should not begin to accrue until the commencement of these proceedings. The Court found that before 1985, "it was uniquely in Kansas' power to begin the process by which [its] damages would

be quantified." *Id.*, at 16. Since 1985, by contrast, it has been uniquely in Colorado's power to protect against the running of interest, whether by tendering a sum of damages to Kansas or by placing the sum in an interest-bearing trust fund. See *In re Oil Spill by the Amoco Cadiz*, 954 F.2d 1279, 1331-1332 (7th Cir. 1992) (*per curiam*). The limitation of interest to the period since 1985 has removed any concern about Colorado being caught unawares by a dramatic compounding of interest.

Colorado has argued that the Court intended to adopt the Special Master's view that damages incurred before Kansas' filing of suit should bear no prejudgment interest, except for an inflation adjustment. Thus Colorado has noted that the Court overruled Kansas' exception to the recommendation in the Third Report that interest should be awarded only from 1969 to the date of judgment. Colorado's Brief in Support of Its Motion to Determine the Amount of Damages and Prejudgment Interest for the 1950-94 Period at 10 (Oct. 11, 2002). It has also noted that, in connection with the briefing of their exceptions to the Third Report, the States estimated that Kansas' damages with prejudgment interest approximated $38 million when calculated as the Special Master had directed. Brief in Support of Kansas' Exception to the Third Report of the Special Master at 9 (Nov. 24, 2000); Brief in Support of Colorado's Exceptions to the Third Report of the Special Master at 6 (Nov. 24, 2000).

Colorado fails, however, to take account of the basis for the Court's decision that interest should be awarded beginning in 1985. In Colorado's view, the Court merely "changed the date" at which interest on Kansas' damages begins to accrue from 1969 to 1985, as if a mere clerical error were at issue. Colorado's Brief in Support of Its

Motion to Determine the Amount of Damages and Prejudgment Interest for the 1950-94 Period at 10 (Oct. 11, 2002). The change of date, however, reflects a fundamental shift as between the rationale on which the Special Master relied and that on which the Court settled in determining that interest should begin to accrue in 1985. The clear basis for the Court's ruling is that Colorado indisputably was on notice of Kansas' claims once it was served with Kansas' complaint. At that point it could not be argued that Colorado's ignorance should relieve it of the obligation to pay interest on Kansas' damages, particularly those that had already been incurred.

Colorado has also suggested that the Court's Opinion reflects an intent to limit Kansas to an interest award of a specific amount. Colorado places particular emphasis on the Court's statement that the Special Master acted properly "*in only awarding as much prejudgment interest as was required by a balancing of the equities.*" Colorado's Reply to Kansas' Brief on Unresolved Damages Issues for the Period 1950-94 at 2-3 (Oct. 31, 2002) (Colorado's emphasis). It protests that Kansas' interpretation of the Court's Opinion, if sustained, would "somewhat astonishingly" result in a larger award of interest than if the Court had simply overruled all exceptions to the Special Master's Third Report. Colorado's Brief in Support of Its Motion to Determine the Amount of Damages and Prejudgment Interest for the 1950-94 Period at 6 (Oct. 11, 2002).

The Special Master apparently was persuaded by Colorado's argument. In his view, "the plain direction" of the Court's Opinion "was to limit the application of prejudgment interest," whereas Kansas' position would "move the award in the opposite direction." App. to Fourth Report 14-15. Thus, from the Court's statement that

interest should be denied for the period between 1968 and 1985, the Special Master inferred an intent "to exempt all damages occurring before the suit was filed from any prejudgment interest." *Ibid.*

It is certainly true that the Court intended to limit Kansas' recovery of prejudgment interest, and it did so by deferring the date of accrual of interest from 1950 to 1985. But Kansas does not perceive in that limitation an intent to fix the interest award at a specific dollar amount. The Court unquestionably intended that neutral principles should determine the resulting interest award, not that a fixed result should determine the operation of those principles. The neutral principles at work in this case support the award of interest accruing as of the time that Colorado was confronted with this lawsuit. Indeed, with the filing of suit, Colorado was much more clearly on notice of Kansas' claim for past violations of the Compact than of any potential violations that might occur thereafter.

Because Kansas is limited to recovery of interest accruing after its filing of suit in 1985, it will not be compensated for the 35 years of investment income that it could have produced over the years 1950-1984. For the same reason, Colorado and its citizens will retain all investment income produced over those years at Kansas' expense. See Third Report 101 ("[W]e should not be oblivious to Colorado's use of the water over this long period of years"). The Court has not suggested, however, that Kansas should further be denied the income that it could have earned *after* 1985 but for Colorado's withholding of money due as damages. It is inconsistent with the Court's ruling to deny Kansas compensation for its ongoing loss of investment income in the years from 1985 through the entry of judgment. Although Colorado will

keep the investment income that it realized through 1985 at Kansas' expense, the evident purpose of the Court's ruling is to restore to Kansas the income foregone thereafter.

The Court's ruling that Kansas is entitled to recover the damages incurred in the years 1950-1984 is in effect a determination that Kansas was entitled to recover those damages at the time it filed suit in 1985. See *Texas v. New Mexico*, 482 U.S. 124, 129 (1987) ("There is often a retroactive impact when courts resolve contract disputes about the scope of a promisor's undertaking; parties must perform today or pay damages for what a court decides they promised to do yesterday and did not"). Were it possible to avoid litigation delay, a judgment could have been entered for Kansas in 1985 for the damages incurred as of that time, adjusted for inflation only. In that case, Kansas would have been protected in either of two ways against lost use of the damages: If Colorado had promptly paid the judgment, Kansas could have invested the money itself. If Colorado had delayed payment, Kansas would have been entitled to postjudgment interest until the judgment was paid. *Id.*, at 132, n.8.

It was not possible, of course, to avoid litigation delay "[d]espite the diligence of the parties and the Special Master." *Kansas v. Colorado*, 533 U.S., at 16. But the effect of that delay "is neutral between the parties." *In re Milwaukee Cheese Wis., Inc.*, 112 F.3d 845, 849 (7th Cir. 1997). "Unfortunate though it is that this case has lasted as long as [it has] . . . , an award of prejudgment interest still restores the parties to the positions they would have occupied had this case concluded in the 1980s rather than the [2000s]." *Ibid.*

4. Conclusion

The Court has ruled that interest should begin to accrue in 1985. That ruling does not address whether the interest should accrue on the damages then owing or only on damages later incurred. The evident intent of the Court's ruling, however, is to protect Kansas from the loss of use of money due as damages during the pendency of the litigation. That intent can be effectuated only if interest is awarded on the damages owing as of 1985, when this litigation began.

C. Colorado's Ten-Year Compliance Period Proposal is Inconsistent With the Compact.

1. Introduction

The H-I Model has been developed over the last 18 years in the course of this litigation for the purpose of quantifying Colorado's Compact obligation. In the course of its development, the H-I Model has been subjected to intense scrutiny and has been successively improved, with the last improvements recommended as part of the Special Master's Fourth Report. See Fourth Report 53-79 (approval of the Penman-Monteith Method for calculating crop consumptive use). Few models have been subject to the scrutiny to which the H-I Model has been subjected. Its results benefit from the fact that they are the difference between two runs of the model, one under current conditions and one without postcompact pumping. When the two runs are subtracted, any errors that occur in both runs cancel out and enhance the accuracy of the results as compared to the accuracy of the individual runs. See 2 First Report 250-251. As the Special Master acknowledges, both States relied upon experts who were "extremely well

regarded" and among the "best . . . in the country." Fourth Report 110. And the experts were using computer modeling and methods of analysis that were largely unknown at the time of the negotiation of the Compact in the late 1940s. Nevertheless, the Special Master, at the urging of Colorado, has determined that the H-I Model is not sufficiently accurate to allow enforcement of short-term Compact obligations over periods of a year or less. See *id.*, at 115. In contrast, Colorado regulates well pumping on a monthly basis for the protection of its own water users. *Id.*, at 10.

The parties agree that the H-I Model should be used to determine Colorado's compliance with the Arkansas River Compact. They differ, however, with regard to the period over which compliance should be measured. Kansas believes that the accounting period should be one year, beginning at the start of the irrigation season and running until just before the next irrigation season. Fourth Report 108-109. Colorado, on the other hand, believes that the accounting period should be ten years. *Id.*, at 116-118.

Kansas believes that the Compact contemplates an accounting period no longer than one year, as argued below. The Special Master, however, finds that "the H-I model is not sufficiently accurate on a short-term basis to be used to determine compact compliance on a monthly or annual basis." *Id.*, at 115. The Special Master therefore disagrees with Kansas' contention that Colorado's ten-year proposal is contrary to the Compact, saying, "The proposal

is simply the most accurate way of determining the actual Kansas entitlement under the Compact."[9] *Id.*, at 120.

This Court has stated firmly that no court may order relief inconsistent with the express terms of an interstate water compact. *Texas v. New Mexico*, 462 U.S. 554, 564 (1983) ("[U]nless the Compact to which congress has consented is somehow unconstitutional, no court may order relief inconsistent with its express terms"). Nor will this Court order relief inconsistent with its interpretation of an interstate allocation by Congress or by compact. See *Arizona v. California*, 373 U.S. 546, 565-567 (1963); *New Jersey v. New York*, 523 U.S. 767, 810-812 (1998). Yet that is precisely what the Special Master has recommended in adopting Colorado's proposal for a ten-year accounting period.

2. A Compliance Period of One Year or Less is a Critical Element of Kansas' Compact Rights.

The Special Master recognized the critical nature of the Arkansas River Compact requirement of timely compliance when he stated in his First Report to the Court:

> "Kansas properly seeks protection against an averaging process that would allow depletions to be offset by later accretions that might not be usable because of amount or timing, or might simply come too late to compensate for earlier injury." 2 First Report 262.

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[9] The Special Master indicated that additional evidence may be necessary. Fourth Report 120.

The Special Master also pointed out that when the States of Kansas and Colorado were before the Court in 1943, the Court emphasized the variable nature of the water supply:

> "'*The critical matter is the amount of divertible flow at times when water is most needed for irrigation. Calculations of average annual flow, which include flood flows, are, therefore, not helpful in ascertaining the dependable supply of water usable for irrigation.*'" *Colorado v. Kansas*, 320 U.S. 383, 396-397 (1943), *quoted in* 2 First Report 291-292 (1994) (emphasis in the Special Master's Report).

The Court's concern that water be available for use when it is needed became a guiding principle of the Compact negotiators, as shown by Article II of the Compact:

> "The provisions of this Compact are based on . . . (2) the opinion of the United States Supreme Court entered December 6, 1943, in the case of *Colorado v. Kansas* (320 U.S. 383) concerning the relative rights of the respective States in and to the use of waters of the Arkansas River. . . . " App. 1, at 2.

The critical nature of timely compliance was also recognized in the proviso of Article IV-D:

> "Provided, that the waters of the Arkansas River, as defined in Article III, shall not be materially depleted in usable quantity *or availability for use* to the water users in Colorado and Kansas under this Compact by such future development or construction." *Id.*, at 5-6 (emphasis added).

Article IV-D thus emphasizes that water cannot be depleted when it is needed and paid back at some other time.

Article V is the primary apportionment paragraph of the Compact. Article V begins "Colorado and Kansas hereby agree upon the following basis of apportionment of the waters of the Arkansas River." *Id.*, at 6. Article V-E(5) provides, "There shall be no allowance or accumulation of credits or debits for or against either State." *Id.*, at 8. This provision of the Compact emphasizes the high priority placed on timeliness of delivery by the Compact as a general principle. The record of the Arkansas River Compact Commission negotiations make this principle even clearer. During the 14th meeting of the Commission, Colorado Commissioners Mendenhall and Ireland commented on this provision:

> "Commissioner Mendenhall suggested that Colorado would not have to wait until the end of the season to complain; that if they did not make delivery, if they violated the compact, there would be complaint the next day. Commissioner Ireland stated that he appreciated that point but that this paragraph was inserted purposely to establish that there would be no carry-over from year to year." Jt. Exh. 3, at 14-84.

While this principle finds expression in the Compact in the major apportionment provision relating to operation of John Martin Reservoir, it evinces the concern that the Compact negotiators recognized with regard to the need for short-term compliance with Compact delivery obligations.

In light of the foregoing, depleting usable flows in one year and overdelivering in the next year would not satisfy Article IV-D or the concerns that the Compact was intended to address. In the worst case, Colorado might otherwise be permitted to deplete in dry years and overdeliver in wet years as it claims to have done in the "exceptionally wet" years of 1997-1999. See Fourth Report 107.

Also, if an underdelivery occurs in the first year of a ten-year compliance period, there will be no requirement that that underdelivery be recognized and remedied in that year or the next. Rather, under Colorado's scheme, it may go unremedied for as long as ten years. And, to the extent it is recognized at all, the underdelivery is only recognized in conjunction with nine other years of results.

3. As in the Pecos River Case, Concerns Regarding the Accuracy of the Best Method to Assess Compact Compliance Should Not Dissuade the Court From Enforcing the Compact Allocation Agreed to by the States.

The Court recognized the existence of uncertainty with regard to the inflow-outflow methodology that it was adopting for allocating the flows of the Pecos River between Texas and New Mexico. The Court stated:

> "[I]t may be that because of the unpredictability and peculiarities of the Pecos, the inflow-outflow methodology we have ordered implemented will not reflect the realities of the river. In that event, it would be appropriate to seek another amendment of the decree, as has been done in other original actions." *Texas v. New Mexico*, 482 U.S. 124, 133 (1987).

In other words, the Court found it appropriate to order a very specific standard to determine compact compliance on the Pecos River, with the proviso that if, because of the unpredictability and peculiarities of the Pecos, the methodology adopted was not fully satisfactory in the future, it would provide a means to make appropriate adjustments. Thus, the Court adopted a specific standard, the best that the Court could determine at the time, reserving the

possibility that it would be necessary to change the methodology in the future.

Following the Court's 1987 Opinion in *Texas v. New Mexico*, the case was remanded to the Special Master for, among other things, specifying the "duties of the river master and the consequences of his determinations." 482 U.S., at 135. On remand the Special Master prepared a proposed amended decree and filed a report. See App. 6 hereto. New Mexico, the upstream State, argued that the Pecos River was "highly variable" and that New Mexico's delivery obligation should be "smoothed out over a longer period than the yearly delivery requirement contemplated in the proposed Amended Decree."[10] App. 5, at 90. New Mexico also asked that her delivery obligations should be measured over a five-year period and that she not be deemed in default until her shortfalls exceeded 30% of the five-year delivery obligation. *Ibid.* The Special Master rejected the New Mexico request, stating, "so long as the principle survives that New Mexico owes water to Texas under the Compact, the only sure, or even probable, way of honoring that principle is to make the delivery obligation an annual one."[11] *Id.*, at 90-91.

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[10] Similarly, in the present case, the Special Master asserts "the need to smooth out the model results." Fourth Report 112.

[11] The urgency of annual Compact compliance is considerably greater on the Arkansas River than on the Pecos River, since there is no significant storage in the downstream State on the Arkansas, whereas there is such storage on the Pecos River. See note 2, *supra*. This difference is reflected in the compacts themselves. The Arkansas River Compact manifests the need for speedy compliance to a much greater degree than the Pecos River Compact. If annual compliance is necessary on the Pecos River, it is all the more necessary on the Arkansas River.

The Special Master in *Texas v. New Mexico* also addressed New Mexico's concerns about the accuracy of the curve that defines New Mexico's stateline delivery obligation:

> "The 1947 condition, as defined in these proceedings, has to be translated into a water quantity to provide a numerical standard for measurement of compliance, and *this necessarily involves a margin of error*. I might add that the margin of error here is not one sided: Texas suffers equally when the curve errs on the side of understating the Article III(a) obligation." App. 5, at 92 (emphasis added).

New Mexico also argued that "the 1947 condition curve is not completely accurate in representing the 1947 condition." *Id.*, at 97. The Special Master responded that, "the inflow-outflow equation is not a formulation by an Einstein of an immutable law of physics." *Id.*, at 98. Thus, the Court and the Special Master in *Texas v. New Mexico* were fully aware of the uncertainties of the quantification that they were adopting to define New Mexico's obligation. Nevertheless, in spite of known uncertainty, the Court, on the recommendation of the Special Master, adopted the best method available to quantify New Mexico's obligation. It noted that the uncertainty was unbiased, just as it is in this case. Consequently, the remedy provided in the Pecos River litigation is fully consistent with the remedy requested by Kansas here. That is, despite the existence of some uncertainty, the Court is fully justified in using the best method available, which minimizes the uncertainty to

the greatest extent possible[12] and insures that the uncertainty that does exist is neutral and unbiased. Abrogation of a State's rights under a compact, because the method of quantification is less than perfect, should be resisted in this case just as it was in *Texas v. New Mexico*.

4. Depletions and Damages Have Been Determined on an Annual Basis Throughout This Litigation.

During the course of this litigation, the annual violations by Colorado for each year beginning in 1950 have been determined and have been used as the basis for the States' recommendations to the Special Master and for the Special Master's determinations. The initial grouping of years was 1950-1985, 36 years. Then a group of nine years was analyzed with the H-I Model, namely, 1986-1994. Next, 1995 and 1996 were assessed using the H-I Model. In the present trial segment, two years, 1997-1998, were analyzed initially, and then a third year, 1999, was added because enough time had passed to allow the 1999 data to become available.

Moreover, throughout the course of this case, the H-I Model has been utilized to develop annual figures of depletions and accretions to usable stateline flows. Thus, in Jt. Exh. 183 the States agreed to an annual listing

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[12] Substantial efforts have been made to calibrate the model and minimize the associated uncertainty. One advantage that the H-I Model has over the curve that was adopted by the Court in the Pecos River litigation is that the results of the H-I Model are the result of taking the difference between two runs of the model. The process of taking the difference of two runs tends to cancel out errors that occur in both runs, improving the certainty of the results. See 2 First Report 250-251.

showing depletions and accretions to usable flows for each year from 1950 through 1996. Further, the individual yearly results have been utilized in the determination of money damages. Many factors that determine money damages vary on a yearly basis, and different yearly values were used between 1950 and 1994 for critical economic factors such as crop prices, labor prices, energy prices and the like. See generally 1 Third Report (2000). Thus, it was critical to that analysis whether depletions of usable flow and violation of the Compact as determined by the H-I Model occurred in one year versus another year. The results would have been different if the years in which the H-I Model showed violations to have occurred were shifted, changed or "smoothed out."

The parties and the Special Master have thus, as a practical matter, used periods much less than ten years as accounting periods for use of the H-I Model to determine Compact compliance. Now Colorado is proposing to adopt a ten-year standard. There is no need to expand a period beyond what has been utilized up to this point by the parties and the Special Master.

5. Conclusion

Colorado has proposed a ten-year compliance accounting period, which has been recommended by the Special Master. If this recommendation is accepted, the critical Kansas right under the Arkansas River Compact to receive its water when the water is needed will have been substantially abrogated. The Compact provides for compliance within a period of one year or less, a principle which is manifested in a number of Compact provisions. The H-I Model, the standard for Compact compliance, like the standard in the Pecos River litigation and most things in life, is subject to some uncertainty. This uncertainty did

not dissuade the Court from enforcing the agreement of the States of New Mexico and Texas in the Pecos River litigation. It should not stop the Court from doing so here. Moreover, calculations of depletions and damages that depend upon the H-I Model have been determined on an annual basis throughout this litigation. There is no reason to extend the compliance period beyond the one year that has been used up to now.

D. This Court Should Not Rely on a Local Colorado Water Court to Determine Issues Critical to the Enforcement of Kansas' Compact Rights.

The Special Master recommends "[t]hat the final amounts of Replacement Plan credits to be applied toward Colorado's compact obligations shall be the amounts determined by the Colorado Water Court, and any appeals therefrom." Fourth Report 138. He goes on to say that such determination shall nevertheless be "subject to the right of Kansas to seek relief under the Court's original jurisdiction." *Id.*, at 138-139. These issues are critical to enforcement of Kansas' rights under the Compact. An overstated credit will result in Kansas' being deprived of water to which it is entitled.

There are strong reasons why this recommendation should not be accepted. The Constitution and federal statutes since the Judiciary Act of 1789 provide that this Court is the only federal court with jurisdiction to determine rights between States. U.S. CONST., art. III, § 2, cl. 2; 28 U.S.C. § 1251(a); *Mississippi v. Louisiana*, 506 U.S. 73 (1992). Further, this Court has stated emphatically that no State may be the judge in a case with another State. *West Virginia ex rel. Dyer v. Sims*, 341 U.S. 22 (1951). ("A State cannot be its own ultimate judge in a controversy with a

sister State. To determine the nature and scope of obligations as between States, whether they arise through the legislative means of compact or the 'federal common law' governing interstate controversies . . . is the function and duty of the Supreme Court of the Nation"). Yet the Special Master's proposal would assign the determination of issues critical to resolving a dispute between the States to a Colorado state court, in a proceeding to which Kansas is not even a party.

Most recently, the Court has said, "Where the States themselves are before this Court for the determination of a controversy between them, neither can determine their rights *inter sese* and this Court must pass upon every question essential to such a determination." *Oklahoma v. New Mexico*, 501 U.S. 221, 241 (1991) (quoting *Kentucky v. Indiana*, 281 U.S. 163, 176-177 (1930)). Moreover, any unilateral decree of the Colorado water court would not be binding on Kansas. *Hinderlider v. La Plata River & Cherry Creek Ditch Co.*, 304 U.S. 92, 102-103 (1938). Thus, issues essential to the determination of this case should be decided by this Court, either directly, with the assistance of the Special Master, for issues ready for resolution, or through a river master for issues that arise under the decree in the future.

The Special Master would have the Colorado water court in Pueblo, Colorado, determine replacement credits for the period 1997-1999 and thereafter. The quantification of credits will play an essential role in determining whether Kansas' rights under the Arkansas River Compact are protected. "To be sure, these various dry-up issues could be decided by the Supreme Court within the parameters of this case." Fourth Report 94. These matters have been the subject of the presentation of evidence and argument. As in *Oklahoma,* the Court, with the assistance

of the Special Master, should pass upon these questions as an essential part of the Court's determination of this case. See 501 U.S., at 241.

E. Colorado Did Not Comply with the Compact During the Period 1997-1999.

The Special Master has recommended that the Court find that Colorado complied with the Compact for the period 1997-1999. Fourth Report 137, ¶ 4. This recommendation depends on whether Compact compliance is to be measured over a period greater than one year as discussed elsewhere in this brief. In Kansas' view an accounting period longer than one year is not consistent with the Compact. Kansas' evidence, which was accepted by the Special Master for this purpose, showed a violation in 1997. See *id.*, at 24-32, App. 73.

F. The Special Master Should be Directed to Make Recommendations on All Issues Pending Before Him.

The Special Master has recommended that Compact compliance be determined "using the version of the model approved at the conclusion of this trial segment." Fourth Report 117-118. Yet the Special Master has made no recommendation in the Fourth Report on 15 issues currently pending before him that are necessary to implement the H-I Model or otherwise determine Compact compliance. These are issues on which evidence and argument have been submitted and which continue to be disputed between the States. Without a decision on the 15 disputed issues, it is not possible to implement an "approved" version of the Model or determine Compact compliance.

The pending disputed issues are listed below together with sample citations to the trial transcript, exhibits, briefs or the Fourth Report. They include the issues that the Special Master would shift to the Colorado Water Court for determination.

Disputed H-I Model Calibration Issues

1. Calibration procedures, parameters and criteria. Fourth Report 123-124; Kan. Op. Br. 47-54.

2. Canal capacities. Kan. Exh. 1093, at 41; Colo. Exh. 1411, at 25-26; Kan. Op. Br. 51-52.

3. Whether Colorado's use of altered diversion records should be rejected. RT Vol. 246 at 31-37.

4. Whether Colorado's use of statistical outliers in the streamflow data, including outliers previously excluded by the Special Master, should be rejected. RT Vol. 243 at 60-63; Kan. Opening Post-Trial Brief 53.

5. Representation of the Sisson-Stubbs water right. Fourth Report 92-95.

Disputed 1997-1999 Accounting Issues

6. Dry-up acreage. Fourth Report 92-95.

7. Sisson-Stubbs credit. *Ibid.*

8. Credit for winter water bookovers. Kan. Exh. 1093, at 17-18.

Disputed Future Compliance Issues

9. Dry-up acreage monitoring, verification and reporting requirement. Fourth Report 93.

10. Dry-up credits and return flow obligations for sources external to the model, including Highland Ditch and Fountain Creek. Kan. Op. Br. 73-75.

11. Whether Colorado can go beyond its precompact uses in claiming credit. Kan. Op. Br. 42-44.

12. Special waters monitoring, verification and reporting. Kan. Exh. 1093, at 20-25.

13. Timing of credit for winter water releases from Pueblo Reservoir. *Id.*, at 19-20.

14. Accounting procedures for Offset Account delivery credits. *Id.*, at 28-29; RT Vol. 241 at 17.

15. Article II consumptive use credit and return flow obligations. Kan. Op. Br. 73-75.

The resolution of these issues is necessary for determination of Compact compliance in the future. The evidence has been presented and the issues are ready for decision by the Special Master. Determination at this time will facilitate the drafting of a decree. Again, as the Court has ruled, "Where the States themselves are before this Court for the determination of a controversy between them, neither can determine their rights *inter sese* and this Court must pass upon every question essential to such a determination." *Oklahoma v. New Mexico*, 501 U.S. 221, 241 (1991) (quoting *Kentucky v. Indiana*, 281 U.S. 163, 176-177 (1930)).

IV. CONCLUSION

The exceptions of the State of Kansas to the Fourth Report of the Special Master should be sustained as follows: (1) a river master should be appointed to administer the

decree in this case; (2) prejudgment interest should begin to accrue in 1985 on damages found to be due at that time; (3) Colorado's ten-year compliance period proposal should be rejected as inconsistent with the Arkansas River Compact, and a one-year period should be adopted instead; (4) reliance on a local Colorado water court to quantify Colorado's credits under the Arkansas River Compact should be rejected; (5) Colorado should be found to have violated the Arkansas River Compact during the years 1997-1999; and (6) the Special Master should be directed to make recommendations on the issues pending before him.

Respectfully submitted,

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The Arkansas River Compact as
Enacted by Congress
63 Stat. 145 (1949)

AN ACT

To grant the consent of the United States to the Arkansas River compact.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the consent of Congress is hereby given to the compact, signed (after negotiations in which a representative of the United States, duly appointed by the President, participated, and upon which he has reported to the Congress) by the Commissioners for the States of Colorado and Kansas on December 14, 1948, at Denver, Colorado, and thereafter ratified by the legislatures of each of the States aforesaid, which said compact reads as follows:

"ARKANSAS RIVER COMPACT

"The State of Colorado and the State of Kansas, parties signatory to this Compact (hereinafter referred to as 'Colorado' and 'Kansas', respectively, or individually as a 'State', or collectively as the 'States') having resolved to conclude a compact with respect to the waters of the Arkansas River, and being moved by considerations of interstate comity, having appointed commissioners as follows: 'Henry C. Vidal, Gail L. Ireland, and Harry B. Mendenhall, for Colorado; and George S. Knapp, Edward F. Arn, William E. Leavitt, and Roland H. Tate, for Kansas'; and the consent of the Congress of the United States to negotiate and enter into an interstate compact not later than January 1, 1950, having been granted by Public Law 34, 79th Congress, 1st Session, and pursuant thereto the

President having designated Hans Kramer as the representative of the United States, the said commissioners for Colorado and Kansas, after negotiations participated in by the representative of the United States, have agreed as follows:

"ARTICLE I

"The major purposes of this Compact are to:

"A. Settle existing disputes and remove causes of future controversy between the States of Colorado and Kansas, and between citizens of one and citizens of the other State, concerning the waters of the Arkansas River and their control, conservation and utilization for irrigation and other beneficial purposes.

"B. Equitably divide and apportion between the States of Colorado and Kansas the waters of the Arkansas River and their utilization as well as the benefits arising from the construction, operation and maintenance by the United States of John Martin Reservoir Project for water conservation purposes.

"ARTICLE II

"The provisions of this Compact are based on (1) the physical and other conditions peculiar to the Arkansas River and its natural drainage basin, and the nature and location of irrigation and other developments and facilities in connection therewith; (2) the opinion of the United States Supreme Court entered December 6, 1943, in the case of Colorado v. Kansas (320 U.S. 383) concerning the relative rights of the respective States in and to the use of waters of the Arkansas River; and (3) the experience

derived under various interim executive agreements between the two States apportioning the waters released from the John Martin Reservoir as operated by the Corps of Engineers.

"ARTICLE III

"As used in this Compact:

"A. The word 'Stateline' means the geographical boundary line between Colorado and Kansas.

"B. The term 'waters of the Arkansas River' means the waters originating in the natural drainage basin of the Arkansas River, including its tributaries, upstream from the Stateline, and excluding waters brought into the Arkansas River Basin from other river basins.

"C. The term 'Stateline flow' means the flow of waters of the Arkansas River as determined by gaging stations located at or near the Stateline. The flow as determined by such stations, whether located in Colorado or Kansas, shall be deemed to be the actual Stateline flow.

"D. 'John Martin Reservoir Project' is the official name of the facility formerly known as Caddoa Reservoir Project, authorized by the Flood Control Act of 1936, as amended, for construction, operation and maintenance by the War Department, Corps of Engineers, later designated as the Corps of Engineers, Department of the Army, and herein referred to as the 'Corps of Engineers'. 'John Martin Reservoir' is the water storage space created by 'John Martin Dam'.

"E. The 'flood control storage' is that portion of the total storage space in John Martin Reservoir allocated to flood control purposes.

"F. The 'conservation pool' is that portion of the total storage space in John Martin Reservoir lying below the flood control storage.

"G. The 'ditches of Colorado Water District 67' are those ditches and canals which divert water from the Arkansas River or its tributaries downstream from John Martin Dam for irrigation use in Colorado.

"H. The term 'river flow' means the sum of the flows of the Arkansas and the Purgatoire Rivers into John Martin Reservoir as determined by gaging stations appropriately located above said Reservoir.

"I. The term 'the Administration' means the Arkansas River Compact Administration established under Article VIII.

"ARTICLE IV

"Both States recognize that:

"A. This Compact deals only with the waters of the Arkansas River as defined in Article III.

"B. This Compact is not concerned with the rights, if any, of the State of New Mexico or its citizens in and to the use in New Mexico of waters of Trinchera Creek or other tributaries of the Purgatoire River, a tributary of the Arkansas River.

"C. (1) John Martin Dam will be operated by the Corps of Engineers to store and release the waters of the

Arkansas River in and from John Martin Reservoir for its authorized purposes.

"(2) The bottom of the flood control storage is presently fixed by the Chief of Engineers, U.S. Army, at elevation 3,851 feet above mean sea level. The flood control storage will be operated for flood control purposes and to those ends will impound or regulate the stream-flow volumes that are in excess of the then available storage capacity of the conservation pool. Releases from the flood control storage may be made at times and rates determined by the Corps of Engineers to be necessary or advisable without regard to ditch diversion capacities or requirements in either or both States.

"(3) The conservation pool will be operated for the benefit of water users in Colorado and Kansas, both upstream and downstream from John Martin Dam, as provided in this Compact. The maintenance of John Martin Dam and appurtenant works may at times require the Corps of Engineers to release water then impounded in the conservation pool or to prohibit the storage of water therein until such maintenance work is completed. Flood control operation may also involve temporary utilization of conservation storage.

"D. This Compact is not intended to impede or prevent future beneficial development of the Arkansas River basin in Colorado and Kansas by Federal or State agencies, by private enterprise, or by combinations thereof, which may involve construction of dams, reservoir, and other works for the purpose of water utilization and control, as well as the improved or prolonged functioning of existing works: Provided, that the waters of the Arkansas River, as defined in Article III, shall not be materially

depleted in usable quantity or availability for use to the water users in Colorado and Kansas under this Compact by such future development or construction.

"ARTICLE V

"Colorado and Kansas hereby agree upon the following basis of apportionment of the waters of the Arkansas River:

"A. Winter storage in John Martin Reservoir shall commence on November 1st of each year and continue to and include the next succeeding March 31st. During said period all water entering said reservoir up to the limit of the then available conservation capacity shall be stored: Provided, that Colorado may demand releases of water equivalent to the river flow, but such releases shall not exceed 100 c. f. s. (cubic feet per second) and water so released shall be used without avoidable waste.

"B. Summer storage in John Martin Reservoir shall commence on April 1st of each year and continue to and include the next succeeding October 31st. During said period, except when Colorado water users are operating under decreed priorities as provided in paragraphs F and G of this Article, all water entering said reservoir up to the limit of the then available conservation capacity shall be stored: Provided, that Colorado may demand releases of water equivalent to the river flow up to 500 c. f. s., and Kansas may demand releases of water equivalent to that portion of the river flow between 500 c. f. s, and 750 c. f. s., irrespective of releases demanded by Colorado.

"C. Releases of water stored pursuant to the provisions of paragraphs A and B of this Article shall be made

upon demands by Colorado and Kansas concurrently or separately at any time during the summer storage period. Unless increases to meet extraordinary conditions are authorized by the Administration, separate releases of stored water to Colorado shall not exceed 750 c. f. s., separate releases of stored water to Kansas shall not exceed 500 c. f. s., and concurrent releases of stored water shall not exceed a total of 1,250 c. f. s.: Provided, that when water stored in the conservation pool is reduced to a quantity less than 20,000 acre-feet, separate releases of stored water to Colorado shall not exceed 600 c. f. s., separate releases of stored water to Kansas shall not exceed 400 c. f. s., and concurrent releases of stored water shall not exceed 1,000 c. f. s.

"D. Releases authorized by paragraphs A, B and C of this Article, except when all Colorado water users are operating under decreed priorities as provided in paragraphs F and G of this Article, shall not impose any call on Colorado water users that divert waters of the Arkansas River upstream from John Martin Dam.

"E. (1) Releases of stored water and releases of river flow may be made simultaneously upon the demands of either or both States.

"(2) Water released upon concurrent or separate demands shall be applied promptly to beneficial use unless storage thereof downstream is authorized by the Administration.

"(3) Releases of river flow and of stored water to Colorado shall be measured by gaging stations located at or near John Martin Dam and the releases to which Kansas is entitled shall be satisfied by an equivalent in Stateline flow.

"(4) When water is released from John Martin Reservoir appropriate allowances as determined by the Administration shall be made for the intervals of time required for such water to arrive at the points of diversion in Colorado and at the Stateline.

"(5) There shall be no allowance or accumulation of credits or debits for or against either State.

"(6) Storage, releases from storage and releases of river flow authorized in this Article shall be accomplished pursuant to procedures prescribed by the Administration under the provisions of Article VIII.

"F. In the event the Administration finds that within a period of fourteen (14) days the water in the conservation pool will be or is liable to be exhausted, the Administration shall forthwith notify the State Engineer of Colorado, or his duly authorized representative, that commencing upon a day certain within said fourteen (14) day period, unless a change of conditions justifies cancellation or modification of such notice, Colorado shall administer the decreed rights of water users in Colorado Water District 67 as against each other and as against all rights now or hereafter decreed to water users diverting upstream from John Martin Dam on the basis of relative priorities in the same manner in which their respective priority rights were administered by Colorado before John Martin Reservoir began to operate and as though John Martin Dam had not been constructed. Such priority administration by Colorado shall be continued until the Administration finds that water is again available in the conservation pool for release as provided in this Compact, and timely notice of such finding shall be given by the Administration to the State Engineer of Colorado or his

duly authorized representative: Provided, that except as controlled by the operation of the preceding provisions of this paragraph and other applicable provisions of this Compact, when there is water in the conservation pool the water users upstream from John Martin Reservoir shall not be affected by the decrees to the ditches in Colorado Water District 67. Except when administration in Colorado is on a priority basis the water diversions in Colorado Water District 67 shall be administered by Colorado in accordance with distribution agreements made from time to time between the water users in such District and filed with the Administration and with the State Engineer of Colorado or, in the absence of such agreement, upon the basis of the respective priority decrees, as against each other, in said District.

"G. During periods when Colorado reverts to administration of decreed priorities, Kansas shall not be entitled to any portion of the river flow entering John Martin Reservoir. Waters of the Arkansas River originating in Colorado which may flow across the Stateline during such periods are hereby apportioned to Kansas.

"H. If the usable quantity and available for use of the waters of the Arkansas River to water users in Colorado Water District 67 and Kansas will be thereby materially depleted or adversely affected, (1) priority rights now decreed to the ditches of Colorado Water District 67 shall not hereafter be transferred to other water districts in Colorado or to points of diversion or places of use upstream from John Martin Dam; and (2) the ditch diversion rights from the Arkansas River in Colorado Water District 67, and of Kansas ditches between the Stateline and Garden City shall not hereafter be increased beyond the

total present rights of said ditches, without the Administration, in either case (1) or (2), making findings of fact that no such depletion or adverse effect will result from such proposed transfer or increase. Notice of legal proceedings for any such proposed transfer or increase shall be given to the Administration in the manner and within the time provided by the laws of Colorado or Kansas in such cases.

"ARTICLE VI

"A. (1) Nothing in this Compact shall be construed as impairing the jurisdiction of Kansas over the waters of the Arkansas River that originate in Kansas and over the waters that flow from Colorado across the Stateline into Kansas.

"(2) Except as otherwise provided, nothing in this Compact shall be construed as supplanting the administration by Colorado of the rights of appropriators of waters of the Arkansas River in said State as decreed to said appropriators by the courts of Colorado, nor as interfering with the distribution among said appropriators by Colorado, nor as curtailing the diversion and use for irrigation and other beneficial purposes in Colorado of the waters of the Arkansas River.

"B. Inasmuch as the Frontier Canal diverts waters of the Arkansas River in Colorado west of the Stateline for irrigation uses in Kansas only, Colorado concedes to Kansas and Kansas hereby assumes exclusive administrative control over the operation of the Frontier Canal and its headworks for such purposes, to the same extent as though said works were located entirely within the State of Kansas. Water carried across the Stateline in the

Frontier Canal or another similarly situated canal shall be considered to be part of the Stateline flow.

"ARTICLE VII

"A. Each State shall be subject to the terms of this Compact. Where the name of the State or the term 'State' is used in this Compact these shall be construed to include any person or entity of any nature whatsoever using, claiming or in any manner asserting any right to the use of the waters of the Arkansas River under the authority of that State.

"B. This Compact establishes no general principle or precedent with respect to any other interstate stream.

"C. Wherever any State or Federal official or agency is referred to in this Compact such reference shall apply to the comparable official or agency succeeding to their duties and functions.

"ARTICLE VIII

"A. To administer the provisions of this Compact there is hereby created an interstate agency to be known as the Arkansas River Compact Administration herein designated as 'the Administration.'

"B. The Administration shall have power to:

"(1) Adopt, amend and revoke by-laws, rules and regulations consistent with the provisions of this Compact;

"(2) Prescribe procedures for the administration of this Compact: Provided, that where such procedures involve the operation of John Martin Reservoir Project

they shall be subject to the approval of the District Engineer in charge of said Project;

"(3) Perform all functions required to implement this Compact and to do all things necessary, proper or convenient in the performance of its duties.

"C. The membership of the Administration shall consist of three representatives from each State who shall be appointed by the respective Governors for a term not to exceed four years. One Colorado representative shall be a resident of and water right owner in Water Districts 14 or 17, one Colorado representative shall be a resident of and water right owner in Water District 67, and one Colorado representative shall be the Director of the Colorado Water Conservation Board. Two Kansas representatives shall be residents of and water right owners in the counties of Finney, Kearny or Hamilton, and one Kansas representative shall be the chief State official charged with the administration of water rights in Kansas. The President of the United States is hereby requested to designate a representative of the United States, and if a representative is so designated he shall be an ex-officio member and act as chairman of the Administration without vote.

"D. The State representatives shall be appointed by the respective Governors within thirty days after the effective date of this Compact. The Administration shall meet and organize within sixty days after such effective date. A quorum for any meeting shall consist of four members of the Administration: Provided, that at least two members are present from each State. Each State shall have but one vote in the Administration and every decision, authorization or other action shall require unanimous vote. In case of a divided vote on any matter

within the purview of the Administration, the Administration may, by subsequent unanimous vote, refer the matter for arbitration to the Representative of the United States or other arbitrator or arbitrators, in which event the decision made by such arbitrator or arbitrators shall be binding upon the Administration.

"E. (1) The salaries, if any, and the personal expenses of each member shall be paid by the government which he represents. All other expenses incident to the administration of this Compact which are not paid by the United States shall be borne by the States on the basis of 60 per cent by Colorado and 40 per cent by Kansas.

"(2) In each even numbered year the Administration shall adopt and transmit to the Governor of each State its budget covering anticipated expenses for the forthcoming biennium and the amount thereof payable by each State. Each State shall appropriate and pay the amount due by it to the Administration.

"(3) The Administration shall keep accurate accounts of all receipts and disbursements and shall include a statement thereof, together with a certificate of audit by a certified public accountant, in its annual report. Each State shall have the right to make an examination and audit of the accounts of the Administration at any time.

"F. Each State shall provide such available facilities, equipment and other assistance as the Administration may need to carry out its duties. To supplement such available assistance the Administration may employ engineering, legal, clerical, and other aid as in its judgment may be necessary for the performance of its functions. Such employees shall be paid by and be responsible

to the Administration, and shall not be considered to be employees of either State.

"G. (1) The Administration shall cooperate with the chief official of each State charged with the administration of water rights and with Federal agencies in the systematic determination and correlation of the facts as to the flow and diversion of the waters of the Arkansas River and as to the operation and siltation of John Martin Reservoir and other related structures. The Administration shall cooperate in the procurement, interchange, compilation and publication of all factual data bearing upon the administration of this Compact without, in general, duplicating measurements, observations or publications made by State or Federal agencies. State officials shall furnish pertinent factual data to the Administration upon its request. The Administration shall, with the collaboration of the appropriate Federal and State agencies, determine as may be necessary from time to time, the location of gaging stations required for the proper administration of this Compact and shall designate the official records of such stations for its official use.

"(2) The Director, U. S. Geological Survey, the Commissioner of Reclamation and the Chief of Engineers, U. S. Army, are hereby requested to collaborate with the Administration and with appropriate State officials in the systematic determination and correlation of data referred to in paragraph G (1) of this Article and in the execution of other duties of such officials which may be necessary for the proper administration of this Compact.

"(3) If deemed necessary for the administration of this Compact, the Administration may require the installation and maintenance, at the expense of water

users, of measuring devices of approved type in any ditch or group of ditches diverting water from the Arkansas River in Colorado or Kansas. The chief official of each State charged with the administration of water rights shall supervise the execution of the Administration's requirements for such installations.

"H. Violation of any of the provisions of this Compact or other actions prejudicial thereto which come to the attention of the Administration shall be promptly investigated by it. When deemed advisable as the result of such investigation, the Administration may report its findings and recommendations to the State official who is charged with the administration of water rights for appropriate action, it being the intent of this Compact that enforcement of its terms shall be accomplished in general through the State agencies and officials charged with the administration of water rights.

"I. Findings of fact made by the Administration shall not be conclusive in any court or before any agency or tribunal but shall constitute prima facie evidence of the facts found.

"J. The Administration shall report annually to the Governors of the States and to the President of the United States as to matters within its purview.

"ARTICLE IX

"A. This Compact shall become effective when ratified by the Legislature of each State and when consented to by the Congress of the United States by legislation providing substantially, among other things, as follows:

"'Nothing contained in this Act or in the Compact herein consented to shall be construed as impairing or affecting the sovereignty of the United States or any of its rights or jurisdiction in and over the area or waters which are the subject of such Compact: Provided, that the Chief of Engineers is hereby authorized to operate the conservation features of the John Martin Reservoir Project in a manner conforming to such Compact with such exceptions as he and the Administration created pursuant to the Compact may jointly approve.'

"B. This Compact shall remain in effect until modified or terminated by unanimous action of the States and in the event of modification or termination all rights then established or recognized by this Compact shall continue unimpaired.

"In Witness whereof, The commissioners have signed this Compact in triplicate original, one of which shall be forwarded to the Secretary of State of the United States of America and one of which shall be forwarded to the Governor of each signatory State.

"Done in the City and County of Denver, in the state of Colorado, on the fourteenth day of December, in the Year of our Lord One Thousand Nine Hundred and Forty-eight.

Henry C. Vidal
Gail L. Ireland
Harry B. Mendenhall
Commissioners for Colorado

George S. Knapp
Edward F. Arn
William E. Leavitt
Roland H. Tate
Commissioners for Kansas

"Attest:

"Warden L. Noe, Secretary

"Approved:

"Hans Kramer

Representative of the United States"

SEC. 2. Nothing contained in this Act or in the compact herein consented to shall be construed as impairing or affecting the sovereignty of the United States or any of its rights or jurisdiction in and over the area or waters which are the subject of such compact: *Provided,* That the Chief of Engineers is hereby authorized to operate the conservation features of the John Martin Reservoir project in a manner conforming to such compact with such exceptions as he and the Administration created pursuant to the compact may jointly approve.

Approved May 31, 1949.

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TEXAS EXHIBIT NO. 108

THE PECOS RIVER MASTER'S MANUAL

November 20, 1987

INTRODUCTION

This manual contains the procedures to be used by the River Master to make the calculations provided for in the decree of the United States Supreme Court in Texas vs. New Mexico, No. 65 Original. These calculations include determinations of negative or positive departures from New Mexico's delivery obligation.

The computational procedures and the computer programs required to make the computations are described in detail in Texas Exhibit No. 79.

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A-3 Gage Height-Area-Capacity Tables for Santa Rosa Reservoir, Published by U.S. Corps. of Engineers, August 1980.

MANUAL OF PROCEDURES TO COMPUTE PECOS RIVER COMPACT COMPLIANCE

A. General

1. The so-called "annual flood inflow" for the Alamogordo Dam[1] to state line reach is defined as the sum of the measured flow of the Pecos River below Alamogordo Dam plus the estimated flood inflows from the Alamogordo Dam to Artesia, Artesia to Carlsbad and Carlsbad to state line reaches. The current year's "annual flood inflow" is averaged with the annual flood inflows for the two prior years. This three-year average quantity is termed the "Index Inflow" and is used as "x" in the equation

$$y = 0.0489892\ (x)^{1.42318}$$

in order to determine the index outflow "y," New Mexico's three- year average 1947 condition delivery obligation at the New Mexico- Texas state line. This index inflow-index outflow equation was approved June 11, 1984 by the U.S. Supreme Court in the Texas vs. New Mexico Pecos River Compact Litigation, No. 65 Original. This equation will be used to determine New Mexico's 1947 condition delivery obligation imposed by the Pecos River Compact. A comparison of the index outflow with the three year average historical outflow will identify any delivery depletions from the 1947 condition which might have occurred.

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[1] On October 17, 1974, Alamogordo Dam was renamed Sumner Dam by the U.S. Congress under Public law 93-447, but for purposes of this manual, Sumner Dam has been usually referenced as Alamogordo Dam.

2. There are several factors which, under terms of the Pecos River Compact, might at times increase or decrease New Mexico's obligation to deliver Pecos River water at state line. When appropriate, the following factors may need to be employed to adjust the computed departures in the Compact compliance computations:

   a. Adjustments for Depletions above Alamogordo Dam

   b. Depletions due to McMillan Dike

   c. Salvage Water in New Mexico

   d. Unappropriated Flood Waters

   e. Texas Water Stored in New Mexico Reservoirs

   f. Beneficial Consumptive Use of Waters of Delaware River by Texas

B. Procedures to Compute Departures of State Line Flows of the Pecos River from the 1947 Condition

   1. General

      a. Compute Index Inflow, Alamogordo Dam to New Mexico-Texas state line as follows:[2]

      (1). The annual flood inflow is computed as follows:

         (a) Gaged flow of the Pecos River below Alamogordo Dam, plus

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[2] All computations are to be performed in units of 1,000 acre-feet rounded to the nearest 100 acre-feet.

(b) Computed flood inflow, Alamogordo Dam to Artesia reach, plus

(c) Computed flood inflow, Artesia to Carlsbad reach, plus

(d) Computed flood inflow, Carlsbad to state line reach.

(2) The Index inflow for one year is the average of the annual flood inflow for that year plus the annual flood inflows for the two prior years.

b. Determine New Mexico's 1947 condition delivery obligation at the New Mexico-Texas state line (Index Outflow). The 1947 condition index outflow is determined by the equation:

$$y = 0.0489892\ (X)^{1.42318}$$

where (X) is the index inflow and Y is the 1947 condition outflow in units of 1,000 acre-feet.

c. Determine the three-year running average historical outflow at the New Mexico-Texas state line.

(1) The annual historical outflow is computed as follows:

(a) Gaged flow of the Pecos River at Red Bluff, New Mexico.

(b) Gaged flow of the Delaware River near Red Bluff, New Mexico.

(2) The three-year average historical outflow for any year is the average of the annual historical outflow for that year and the two prior years.

d. Compute annual departures of state line flows of the Pecos River from the 1947 condition. Compute each annual departure by subtracting the annual 1947 condition delivery obligation (index outflow) from the corresponding three-year average historical outflow. Add algebraically the adjustments to the computed departures as determined under the provisions in Part C herein. A negative departure indicates an underdelivery at state line and a positive departure indicates an overdelivery.

Figure 1 shows the approximate boundary of the Pecos River Basin from its headwaters in New Mexico to the gaging station of the Pecos River near Girvin, Texas. Figures 2, 3 and 4 are stick diagrams of the main stem of the Pecos River showing important tributaries, gaging stations, diversion facilities and reservoirs in New Mexico and Texas.

[Figure 1 Omitted]

[Figure 2 Omitted]

[Figure 3 Omitted]

[Figure 4 Omitted]

2. Determination of Alamogordo Reservoir Releases and Spills

Use the monthly United States Geological Survey (USGS) streamflow records for the gaging station, Pecos River below Alamogordo Dam, as the measure of releases and spills from the reservoir.

3. Determination of Flood Inflows, Alamogordo Dam to Artesia

The computational items used to estimate the flood inflows to this 197.8 river mile reach of the Pecos River are listed below, followed by an explanation for each computation to be made. Monthly quantities for each item will be measured or computed, and the annual quantity will be the sum of the monthly quantities.

Streamflow below Alamogordo Dam (see 3.a. below).
Fort Sumner Irrigation District diversion (see 3.b. below)
Fort Sumner irrigation District return flow (see 3.c. below)
Streamflow past Fort Sumner Irrigation District (see 3.d. below)
Channel loss, Alamogordo Dam to Acme (see 3.e. below)
Computed Residual Flow at Acme (see 3.f. below)
Base inflow, Acme to Artesia (see 3.g. below)
River pump depletions, Acme to Artesia, (see 3.h. below)
Residual Flow at Artesia (see 3.i. below)
Streamflow, Pecos River near Artesia (see 3.j. below)
Flood inflow, Alamogordo Dam to Artesia (see 3.k. below)

a. Streamflow Below Alamogordo Dam

Use the monthly USGS streamflow records for the gaging station, Pecos River below Alamogordo Dam, N.M.

b. Fort Sumner Irrigation District Diversion

Use the monthly USGS discharge records for the gaging station, Fort Sumner Main Canal near Fort Sumner, N.M.

c. Fort Sumner Irrigation District Return Flow

Use 53 percent of the total annual diversion (item b. above) and distribute on a monthly basis as follows:

MONTH	J	F	M	A	M	J	J	A	S	O	N	D
PERCENT	4	3	7	8	12	12	12	12	11	10	5	4

d. Streamflow Past Fort Sumner Irrigation District

From the streamflow below Alamogordo Dam (Item 3.a.), subtract the Fort Sumner Irrigation District diversions (Item 3.b.), and add the Fort Sumner Irrigation District return flows (Item 3.c.). Whenever the computed flow past the District is less than the return flow, set the flow past the District (Item 3.d.) equal to the return flow (Item 3.c.).

e. Channel Loss, Alamogordo Dam to Acme

Compute the monthly river channel losses using the equations below, where X is the flow past the Fort Sumner Irrigation District in units of 1000 acre-feet (Item 3.d.). Whenever the computed loss exceeds the calculated flow past the District, the channel loss (Item 3.e.) is set equal to the flow past the District (Item 3.d.). Any computed negative channel loss is set equal to zero.

Month	Channel Loss "L" by Month in 1000 Acre-Feet
Jan, Feb, Dec	L = 0.404X - 0.033
Mar	L = 0.172X + 0.324
Apr, May	L = 0.117X + 1.142
Jun	L = 0.173X + 0.998
Jul	L = 0.157X - 0.182
Aug	L = 0.109X + 1.295
Sep, Oct	L = 0.129X + 0.456
Nov	L = 0.233X + 0.078

f. Computed Residual Flow at Acme

Item 3.d.-Item 3.e.

g. Base Inflow, Acme to Artesia

Use the monthly base inflow quantities determined and furnished by the USGS.

h. River Pump Depletion, Acme to Artesia

Use monthly river pump diversion quantities compiled by USGS based upon river pumping from the Pecos River in the Acme to Artesia reach as reported by the New Mexico Pecos River Water Master.

i. Residual Flow at Artesia

Item 3.f. + Item 3.g.-Item 3.h.

j. Steamflow [sic] , Pecos River near Artesia

Use the monthly USGS streamflow records for the gaging station, Pecos River near Artesia, N.M.

k. Flood Inflow, Alamogordo Dam to Artesia

Item 3.j.-Item 3.i.

Table 1 shows sample computations for years 1982 and 1983 extracted from Texas Exhibit 79.

4. Determination of Flood Inflows, Artesia to Carlsbad

The computational items used to estimate the flood inflows for this 45.3 river mile reach of the Pecos River are listed below, followed by an explanation of each computation to be made. Monthly quantities for each item will be measured or computed, and the annual quantities will be the sum of the monthly quantities.

Steamflow [sic], Pecos River near Artesia (see 4.a. below)
Major Johnson Springs (new water) (see 4.b. below)
Carlsbad Springs (new water) (see 4.c. below)
Total inflow (see 4.d. below)
Channel losses (see 4.e. below)
Evaporation losses (see 4.f. below)
Change in storage (see 4.g. below)
Net Carlsbad Irrigation District diversions (see 4.h. below)
Other depletions (see 4.i. below)
Steamflow [sic], Pecos River at Carlsbad (see 4.j. below)
Total outflow (see 4.k. below)
Total Flood inflow, Artesia to Carlsbad (see 4.l. below)

[Table 1 Omitted]

a. Streamflow, Pecos River near Artesia

Use the monthly USGS streamflow records for the gaging station, Pecos River near Artesia, N.M. (Same as Item 3.j.)

b. Major Johnson Springs (New Water)

(1) Use the equation (X) = 22.737-0.1578 (Y) to compute the summer new water discharge rate at Major Johnson Springs, where (X) is the average summer new water discharge rate in cfs and (Y) is the average summer depth in feet below land surface to water level in well 20.26.8.1211 for the months of July, August and September as measured by the USGS.

(2) Compute the monthly new water discharge rates using the following equations:

Months	Rate
Jan, Feb, Mar	X + 5.0 cfs
Apr, May, Jun	X + 2.5 cfs
Jul, Aug, Sep	X
Oct, Nov, Dec	X + 2.5 cfs

wherein X is the new water discharge rate computed in 4.b.(1) above.

Convert the new water discharge rates to units of 1,000 acre-feet each month.

(3) Once Brantley Reservoir begins impounding water, compute the Major Johnson Springs new water by the water balance technique using the following factors in addition to reservoir evaporation, content changes and diversions:

(a) Gaged inflows into and outflows (including spills and releases) from Brantley Reservoir and;

(b) Losses and gains to Brantley Reservoir bank storage by piezometric measurements.

If the above data are not available, the Major Johnson Springs new water shall be assumed to be 8200 acre-feet per year for the water years 1988 and 1989. If the gages and piezometers have not been installed by January 1, 1989, the River Master shall have the gages and piezometers installed and shall bill the expenses of the installation to the states.

c. Carlsbad Springs New Water

(1) use the following procedure to compute the monthly new water discharge quantities rounded to the nearest 100 acre-feet.

(a) Use the annual streamflow records (expressed in cfs) furnished by the USGS for the gaging station, Pecos River below Dark Canyon, at Carlsbad, N.M.

(b) Subtract tributary inflow from Dark Canyon Draw, furnished by USGS at Dark Canyon Draw at Carlsbad gaging station.

(c) Subtract releases and spills from Lake Avalon which are furnished by USGS for gaging station, Pecos River Below Avalon Dam, N.M.

(d) Add 2 cfs for the annual depletions from the Pecos River from the Carlsbad canal flume to the Carlsbad gage. These depletions are caused by the power plant consumptive use, evaporation from Tansill and Bataan Lakes, and all diversions, including the Carlsbad golf course, F. V. Dowling and E. J. Hines.

(e) Subtract the lagged seepage from the main CID canal in cfs which is computed to be 7 percent of the CID diversions measured at Avalon Dam by USGS for gaging station, Carlsbad Main Canal at Head, Carlsbad, N.M. This seepage will have a lagged distribution as follows: one-half in the current quarter; one-third in the following quarter; and one-sixth in the next quarter.

(f) Subtract one cfs to represent the average annual return flow from surface water irrigation between Avalon Dam and the gaging station Pecos River at Carlsbad.

(g) Subtract lagged leakage from Lake Avalon. The leakage from Lake Avalon is estimated by using the mean monthly gage height (H) in feet for Lake Avalon (published by USGS for Lake Avalon Near Carlsbad, N.M.), in the equation: Avalon leakage in cfs = 4.78 (H)-62.0. One-half of the leakage is assumed to appear at Carlsbad Springs during the current

quarter, with one-third to appear during the following quarter and one-sixth during the next quarter.

(h) Subtract 3 cfs to represent the average seepage loss from the Pecos River in the reach between Major Johnson Springs and Dam site No. 3 gage.

(i) The annual new water in cfs is: (a)-(b)-(c)+(d)-(e)-(f)-(g)-(h).

(j) Convert the new water in cfs, item (i), above, to units of 1000 acre-feet, and distribute equally to each month of the year.

B.4. d. Total Inflow

This is the sum of Items B.4.a., B.4.b. and B.4.c.

e. Channel Losses

Compute the monthly river channel losses using the equation (Y) = 0.2165(X)-0.3845, where (Y) is the monthly river channel loss and (X) is the monthly flow of the Pecos River at Artesia in units of 1000 acre-feet (Item 4.a.).
Whenever the computed loss exceeds the flow of the Pecos River at Artesia, the calculated loss is set equal to the flow at Artesia. The maximum loss during any one month is limited to 14,300 acre-feet.

f. Evaporation Loss

(1) Compute the total monthly evaporation loss by multiplying the monthly net

evaporation rates times the average monthly surface areas for Lake Avalon and Lake McMillan and adding the two quantities.[3]

(2) Use the USGS elevation, area and capacity relationships for Lake Avalon and Lake McMillan Reservoirs to estimate the average monthly surface area for each reservoir.[3] The 1984 area-capacity table for Lake McMillan (Table 2) is to be used until a revised area-capacity table becomes available

[Table 2 Omitted]

[Table 3 Omitted]

and is approved for use. The 1982 area-capacity table based on the 1979 United States Bureau of Reclamation (USBR) sediment survey for Lake Avalon (Table 3) is to be used until a revised area-capacity table based on a new sediment survey performed by the USBR, the U.S. Army Corps of Engineers, USGS, U.S. Soil Conservation Service or a state-registered engineer is available.

Gage height-area-capacity tables for Brantley Reservoir are shown in Appendix A-2 to this Manual.

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[3] When Brantley Reservoir begins impounding water, the evaporation loss and storage change shall be computed for both Brantley and McMillan Reservoirs until the McMillan Dam is breached and no water is stored in McMillan Reservoir after which only Brantley Reservoir will be considered.

B.4.f. (3) Use U.S. Weather Bureau evaporation data for Lake Avalon and precipitation data for Artesia and Lake Avalon. Missing evaporation data are to be computed using the following equation:

$$E_L = 2.5 \left[\frac{p}{100} \frac{T(114-H)}{100} - 0.6 \right]$$

where E_L is the lake evaporation rate in inches; "p" is the percentage of daytime hours at the approximate latitude of McMillan and Avalon Reservoirs, as given in the table below; "T" is the mean monthly temperature in °F average of Artesia and Carlsbad; "H" is the average percent humidity for the month computed from the data at 5AM, 11AM, 11PM furnished by the U.S. Weather Bureau.

Table of Percentage of Daytime Hours for McMillan & Avalon Reservoirs

Jan	Feb	Mar	Apr	May	Jun
7.17	6.95	8.36	8.76	9.65	9.62
Jul	Aug	Sep	Oct	Nov	Dec
9.80	9.29	8.34	7.92	7.08	7.02

(a) If Lake Avalon evaporation data are not available, and humidity data at Roswell and other data are not available for estimating evaporation at Lake Avalon and there is not more than one month missing between months for which data are available, estimate the evaporation by interpolation between monthly data. If complete evaporation data are missing for more than two consecutive months and data for all of the above described

methods are not available, find the average daily evaporation that is published for that month and estimate total evaporation by multiplying the average daily evaporation times the number of days in the month.

(b) If precipitation data at Lake Avalon are not available, use Carlsbad precipitation; if Carlsbad precipitation is not available, use the precipitation data at Carlsbad Federal Aeronautic Administration Airport.

(c) Pan evaporation as determined at Lake Avalon is converted to lake surface evaporation by applying a factor of 0.77 and reducing it by the precipitation at Lake Avalon for obtaining the net evaporation rate at Lake Avalon.

For Lake McMillan, the computed lake evaporation rate of Lake Avalon is reduced by the average precipitation at Artesia and Lake Avalon.[4] The computed net evaporation rates are then converted from inches to feet.

g. Change in Storage

Use change in storage data from USGS gage height records for Lake Avalon near Carlsbad, N.M. and for Lake McMillan[5] near

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[4] In the future, if pan evaporation data are available at the Brantley Dam site, use these data in estimating the evaporation rates. If data are not available for Brantley Reservoir, use the procedures described in B.4.f.

[5] See Footnote 3

Lakewood, N.M. and using gage height-area-capacity data shown in Tables 2 and 3.

h. Net Carlsbad Irrigation District Diversions

Use 93 percent of the USGS published records for the gaging station, Carlsbad Main Canal at Head, Near Carlsbad, N.M.

i. Other Depletions

(1) For other depletions referenced in B.4.c. (1) (d) add 100 acre-feet for all months except July and August.
and 200 acre-feet for July and August.

(2) Add any depletions as determined by the USGS caused by Brantley Reservoir and due to loss of water to underground aquifers and to the bank storage.

j. Streamflow, Pecos River at Carlsbad

Use the USGS gaging station records for Pecos River below Dark Canyon, at Carlsbad, NM, minus the gaged streamflow at the USGS gaging station, Dark Canyon Draw at Carlsbad, NM.

In 1970, the USGS discontinued the gaging station Pecos River at Carlsbad, NM, and moved it to a new site about 0.8 mile downstream. The new "Carlsbad gage" was renamed Pecos River below Dark Canyon Draw and it now measures tributary inflow from Dark Canyon Draw that was not previously measured at the Carlsbad site. The total flow of Dark Canyon must be subtracted from the total flow Pecos River below Dark Canyon Draw in order to arrive at the equivalent total flow at the old location at Carlsbad. This subtracted

amount will be added as part of flood inflow in Carlsbad to state line reach.

k. Total Outflow

This is the algebraic sum of Items B.4.e., B.4.f., B.4.g., B.4.h., B.4.i. and B.4.j.

l. Flood Inflow, Artesia to Carlsbad

Determine this quantity by subtracting the total inflow, Item B.4.d., from the total outflow, Item B.4.k.

Table 4 shows sample computations for years 1982 and 1983 extracted from Exhibit No. 79.

B.5. Determination of Flood Inflows, Carlsbad to New Mexico-Texas State Line

Because of the lack of sufficient data to accurately compute flood inflow in the Carlsbad to state line reach by the inflow-outflow method, the flood inflow for this reach is to be determined by the hydrograph scalping method. Figure 5 shows the factors to be considered in scalping flood flows from the hydrographs. The computational items used to estimate flood inflows to this 54 river mile reach of the Pecos River are listed below, followed by an explanation of each computation to be made. Monthly quantities for each item will be computed from daily streamflow quantities. The annual quantities will be the sum of the computed monthly flood inflow quantities.

Flood inflow, Carlsbad to state line not including Delaware River flood inflow (see a. below)

Flood inflow, Delaware River (see b. below)

Total flood inflow, Carlsbad to state line (see c. below)

[Table 4 Omitted]

a. Flood Inflow, Carlsbad to USGS Gage at Red Bluff, N.M.

Use the following procedure

(1) Prepare daily hydrographs for the USGS gaging station Pecos River below Dark Canyon, at Carlsbad, New Mexico, and Pecos River at Red Bluff, New Mexico and identify apparent flood inflows by hydrograph scalping techniques.

(2) Compute the flood inflows occurring between the upstream and downstream gaging stations as the difference between the scalped flood flow quantities of the two hydrographs; however, flood inflows are only considered when 0.05 inches or more of precipitation has occurred within the reach. Add the gaged flows of Dark Canyon Draw to the scalped flood inflows.

b. Flood Inflow, Delaware River

Use the daily records furnished by the USGS for the gaging station, Delaware River near Red Bluff, N.M. and select flood inflows by inspection of daily data.

c. Flood Inflow, Carlsbad to state Line

Add the estimated flood inflows from item 5.a. to that quantity determined in item 5.b.

[Figure 5 Omitted]

C. Adjustments to Computed Departures

1. Adjustments for Depletions Above Alamogordo Dam

a. Depletions Due to Irrigation

(1) In computing the total irrigated acreage in the Upper Reach, above Alamogordo Dam, to which surface and/or groundwater has been applied during any time of the year, use the irrigated acreage shown on the most recent irrigation inventory as reported by New Mexico. If any water right acreage in the Upper Reach is converted to another use, the depletion will be computed as if the use was irrigation use.

(2) Determine the consumptive use of irrigated acreage by multiplying the irrigated acreage determined in 1.a.(1) by the unit depletion rate for the year in question in acre-feet/acre. The unit depletion rate is determined as follows:

(a) Tabulate the monthly precipitation furnished for the Las Vegas Federal Aviation Administration Airport, Pecos Ranger Station and Santa Rosa for the months April through October. Find the effective precipitation for each station for each month using Figure A-7-2, page 7-11, of Stipulated Exhibit No. 8.

(b) Compute the average effective precipitation of the three stations

for each month in inches. Convert the monthly effective precipitation in inches to feet.

(c) Using the following distribution of monthly unit consumptive use of 1.77 acre-feet per acre, subtract the estimated effective precipitation determined in Step 2 from the monthly unit consumptive use.

DISTRIBUTION OF MONTHLY UNIT CONSUMPTIVE USE[6]

(acre-feet per acre)

Apr	May	Jun	Jul	Aug	Sept	Oct	TOTAL
.19	.36	.36	.30	.27	.18	.11	1.77

(d) If the monthly effective precipitation estimated in Step 2 equals or exceeds the total monthly consumptive use, set the streamflow depletion equal to zero. If the monthly effective precipitation is less than the consumptive use, the difference is the streamflow depletion. Add the estimated streamflow depletion computed each month April through October to determine the annual streamflow depletion rate to be applied to the historic irrigated acreage for the water year.

[6] Monthly distribution of 1.77 acre-feet annual consumptive use calculated from table shown on page 41 of Stipulated Exhibit 11b.

(c) Multiply the streamflow depletion rate determined in Step 4 by the irrigated acreage for the water year to determine the total streamflow depletion of the irrigated lands in the upper reach.

(3) Compare the 1947 condition irrigation consumptive use (14,600 acres x 0.74 acre-feet/acre = 10,804 acre-feet per year) with Item (2). If the 1947 condition use exceeds the actual use during the year computed in (2), the gaged streamflow below Alamogordo Dam will be reduced by the difference.

If the actual use computed in (2) exceeds the 1947 condition use, i.e., 10,804 acre-feet per year, then add the difference to the gaged streamflow below Alamogordo Dam.

Recompute New Mexico's 1947 condition delivery obligation and departures at the state line using the revised streamflow of Pecos River below Alamogordo Dam.

b. Depletions Due to Operation of Santa Rosa Reservoir

(1) Determine the average monthly contents of Santa Rosa and Alamogordo Reservoirs and add these two contents to obtain the sum of contents. Use the gage height-area-capacity tables for each reservoir as shown in Appendices A-1 and A-3 of this Manual.

(a) Use the latest gage height-area-capacity Tables for Alamogordo Reservoir as published by U.S. Bureau of Reclamation and in Appendix A-1 to this Manual until another survey is undertaken and area-capacity Tables are published by the U.S. Bureau of Reclamation.

(b) Use the latest gage height-area-capacity Tables for Santa Rosa Lake (Lake Los Esteros) as published by the U.S. Army Corps of Engineers, Albuquerque District, August 1980, and extracted and shown in Appendix A-3 to this Manual, and currently being used by the USGS until another sediment survey is undertaken and area-capacity Tables published.

(2) Compute the monthly historic evaporation losses from Alamogordo Reservoir using the historic average surface area of Alamogordo Reservoir by multiplying it by the net evaporation rate at Alamogordo Dam. Compute the monthly net evaporation rate at Alamogordo Dam at 0.77 times the monthly pan evaporation rate at Alamogordo Dam minus the monthly precipitation at Alamogordo Dam.

(3) Compute the monthly historic evaporation losses from Lake Santa Rosa using the historic average surface area of Lake Santa Rosa multiplying it by the net monthly evaporation rate at Lake Santa Rosa. Compute the net monthly

evaporation rate at Lake Santa Rosa as 0.77 times the monthly pan evaporation rate at Lake Santa Rosa minus the monthly precipitation at Lake Santa Rosa.

New Mexico is to provide the pan evaporation and precipitation data for Lake Santa Rosa and Alamogordo Reservoir.

(4) Add the two net monthly historic evaporation losses from Alamogordo and Santa Rosa Reservoirs computed in (2) & (3) above.

(5) Compute the 1947 condition net monthly evaporation loss from Alamogordo Reservoir by assuming its contents equal to the total historic contents of Lake Santa Rosa and Alamogordo Reservoir determined in (1) above. Use the same net evaporation rate from Alamogordo Reservoir as computed in (2) above. (Use Table 3 of Texas Exhibit 68 for Alamogordo Reservoir.)

(6) Subtract 1947 condition net monthly evaporation loss from Alamogordo Reservoir computed in (5) from the total historic net monthly evaporation loss from Alamogordo and Santa Rosa Reservoirs computed in (4) above. Add the 12 monthly values algebraically to make the annual adjustment for excess evaporation.

(7) Compute the excess water held in these two reservoirs during the year over and above the 1947 condition storage of

129,300 acre-feet by the following procedure:

(a) Determine the end of the year combined contents of Santa Rosa and Alamogordo Reservoirs for the current year and the previous year. If both quantities are equal or less than 129,300 acre-feet then the adjustment for excess storage is zero;

(b) If both end of year combined contents are in excess of 129,300 acre-feet, then subtract algebraically the previous year's combined end of year contents from the current year's combined end of year contents;

(c) If the current year's end of year combined contents are less than 129,300 acre-feet and the previous year's end of year combined contents are in excess of 129,300 acre-feet, then subtract algebraically the previous year's combined end of year contents from 129,300 acre-feet; and

(d) If the current year's end of year combined contents are in excess of 129,300 acre-feet but the previous year's end of year combined contents are less than 129,300 acre-feet, then subtract 129,300 acre-feet from the current year's combined end of year contents.

(8) Add algebraically the adjustment for excess evaporation loss computed in

(6) above to the adjustment for excess storage held in these two reservoirs, computed in (7) above.

(9) Add algebraically the adjustment computed in (8) to the annual gaged flow below Alamogordo Dam for computing the index inflows.

(10) Recompute New Mexico's 1947 condition delivery obligation and departures at the state line using the adjusted index inflows.

c. Transfer of Water Use by New Mexico to the Upper Reach Upstream from Alamogordo Dam

Add to the streamflow of Pecos River below Alamogordo Dam, the effect of the amount of water diverted by New Mexico upstream of Alamogordo Dam transferred from the reach below Alamogordo Dam to the state line as reported by New Mexico. If the amount of the diversions is not furnished by New Mexico by March 1, each year, assume the diversion equals the amount of water authorized for transfer in the permit.

Recompute New Mexico's 1947 condition delivery obligation and departures at the state line using the revised streamflow of Pecos River below Alamogordo Dam.

2. Depletions Due to McMillan Dike

Credit the computed departures in B.1.d. with the quantities of depletions caused by the McMillan Dike.

Compute the depletions caused by the McMillan Dike using the following procedures:

a. Use the Alamogordo Dam to New Mexico-Texas state line index inflow computed in B.1.a(2) for the computation year and compute the 1947 condition outflow with McMillan Dike using the following equation:

$$Y=0.046399\ (X)^{1.430603}$$

Where (X) is the index inflow and Y is the 1947 condition outflow in units of 1000 acre-feet.

b. Subtract the outflow computed in 2.a above from the outflow quantity computed in B.1.b.

c. Credit the departures in state line flows computed in B.1.d by the quantity computed in 2.b above.

3. Salvage Water Analysis Criteria and Procedures

a. The term "water salvaged" means that quantity of water which may be recovered and made available for beneficial use and which quantity of water under the 1947 condition was non-beneficially consumed by natural processes.

b. The water salvaged in New Mexico, measured at or near Avalon Dam, through the construction and operation of a project or projects by the United States or by joint undertakings of Texas and New Mexico is apportioned by the Compact as follows: forty-three percent (43%) to Texas and fifty-seven percent (57%) to New Mexico.

c. Any other water salvaged by New Mexico is apportioned by the Compact to New Mexico but will not have the effect of diminishing the quantity of water available to Texas under the 1947 condition. Therefore, the annual Compact compliance computations are only concerned with the water salvage resulting from projects participated in by the United States or from joint Texas-New Mexico projects.

d. Study each water salvage project participated in by the United States and/or each joint Texas-New Mexico project. Determine the amount of water salvaged, if any, and convert to a three year running average quantity.

e. Route the water salvaged from place of occurrence to Avalon Dam, considering only non-beneficial consumption by natural processes. Forty-three percent (43%) of the routed water salvaged reaching Avalon Dam is apportioned to Texas. Add the total quantity of water salvaged that is apportioned to Texas to the delivery obligation of New Mexico at the New Mexico-Texas state line.

4. Unappropriated Flood Waters Analysis Criteria and Procedures

The River Master shall determine and apportion any unappropriated flood waters using methodologies not inconsistent with applicable provisions of the Compact and this Manual.

5. Texas Water Stored in New Mexico Reservoirs.

If a quantity of the Texas allocation is stored in facilities constructed in New Mexico at the

request of Texas, then, to the extent not inconsistent with the conditions imposed pursuant to Article IV(e) of the Compact, this quantity will be reduced by the amount of reservoir losses attributable to its storage, and, when released for delivery to Texas, the quantity released less channel losses is to be delivered by New Mexico at the New Mexico-Texas state line.

6. Beneficial Consumptive Use of Waters of Delaware River by Texas.

Add to the computed departures at the New Mexico-Texas state line the amount of beneficial consumptive use of waters of the Delaware River by Texas. These uses shall be furnished by Texas by March 1 each year.

[Appendices omitted from Kan. Exh. 1104]

No. 65, Original

IN THE
SUPREME COURT OF THE UNITED STATES

OCTOBER TERM, 1990

STATE OF TEXAS, Plaintiff,

v.

STATE OF NEW MEXICO, Defendant.

Office of the River Master: Neil S. Grigg

MODIFICATION DETERMINATION NEW MEXICO'S AMENDED FIRST MOTION TO MODIFY THE RIVER MASTER'S MANUAL

New Mexico's Amended First Motion to Modify the River Master's Manual, dated December 9, 1988, is to modify Section B.3.g as follows:

B.3.g. Base Flow, Acme to Artesia

Use the monthly base inflow quantities determined [and furnished by the USGS] following the procedures used in Texas Exhibit 68. (Text in brackets to be deleted; text underlined to be added to the original motion)

Modification Determination.

The River Master amends this Motion by replacing the existing Section B.3.9 [sic] with new and amended language as follows:

B.3.g. Base Flow, Acme to Artesia

For the River Master's Preliminary Report use the monthly base inflow quantities determined and furnished

by the USGS. USGS will utilize the best available data and methods to estimate the total monthly base inflows accruing to the Acme to Artesia reach. In their report USGS will describe the data and methods used to estimate the base inflows and describe any unusual hydrologic events that occurred during the water year. After review of any objections to the USGS estimates by the states the River Master will make any adjustments deemed necessary to the base inflow estimates and determine the base inflow quantities for the Final Report. If no monthly base inflow quantities are determined and furnished by USGS the River Master will prepare the estimates for the Preliminary Report. (added language is underlined)

Dated: December 26, 1990

/s/ Neil Grigg
Neil S. Grigg
River Master of the Pecos River

Grounds for Modification Determination

Explanation of motion. New Mexico's Amended First Motion would instruct the River Master to make the base inflow determination following "the procedures used in Texas Exhibit 68". Texas Exhibit 68 presented a river routing study to compute the 1947 condition inflow-outflow relationship. New Mexico's First Motion to Modify the River Master's Manual, which was rejected on November 18, 1988, sought the same goal, but with USGS making the computation. New Mexico's goal in both the First Motion and Amended First Motion is to prevent the deduction of Rio Hondo flows from the measured flows at the Artesia gage when base inflow is estimated.

Chronology of the motion. In rejecting New Mexico's First Motion on November 18, 1988, I stated that the States had the following options to resolve the issue: to ask USGS to provide a base flow analysis using the same approach as in Texas Exhibit 68; or New Mexico could develop and move an alternative procedure that the River Master could implement independently of USGS. I wrote that any alternative procedure would have to be: presented in detail, subjected to the review requirements of the Amended Decree, objective, repeatable and based on data that had been collected by existing data collection agencies.

New Mexico furnished a proposed procedure on January 24, 1989 and Texas' reply, including an alternative proposed procedure, was received on February 24, 1989. At a meeting in Albuquerque on March 20-21, 1989 Texas expressed the view that it might be possible to reach agreement about the procedure, and New Mexico and Texas agreed to evaluate each other's suggested procedures and exchanged suggestions for procedures to enable a common basis for comparison. The States agreed to report to the River Master about the outcome of the comparative studies by May 31, 1989 (later extended to September 30).

After the meeting I informed Special Master Monte Pascoe of the discussion and outcome, and Mr. Pascoe agreed to consult the parties to determine how and when to consider questions about the standard for modifying the Manual. Mr. Pascoe's reply to my question was received on November 15, 1990.

On September 30 the evaluations of each state were received. In Texas' response different technical approaches

were evaluated. Texas presented results from three methods as applied to the October 1984 – March 1986 period: Texas' method (criteria 5) – 41.6 TAF; New Mexico's method – 40.8 TAF, and USGS method – 40.8 TAF. Comparable figures for 1985 only were 25.5 TAF; 23.9 TAF and 24.9 TAF. Thus Texas saw results from the three methods as similar, but acknowledged that there would be differences from period to period, and that the concept of stable period may be important to include in the method.

New Mexico's response differed markedly from Texas' response. Calculations by New Mexico for year 1985 were: Texas method (modified by NM) 2.4 TAF; New Mexico method (also called Texas Exhibit 68 method) 32.4 TAF; USGS method 24.9 TAF; and a modified USGS method 30.7 TAF.

To summarize the calculation comparisons (in TAF) for year 1985:

	New Mexico	Texas
Texas method	2.4	25.5
New Mexico method	32.4	23.9
Modified USGS method	30.7	
USGS method (not reevaluated)	24.9	24.9

This shows a disparity in applying either state's method by the other state. New Mexico also entered a number of objections about Texas' proposed method, including a statement that "Any attempt to distribute an unknown amount into base and flood components must be viewed with skepticism (page 11, New Mexico Response). The disparity in results indicate either that a gap exists in each state's understanding of the other's method, or that the subjectivity inherent in the methods prevents repeatability. New Mexico later suggested that the difference was Texas' not following the agreed upon procedures.

It was apparent from this exercise that the states had not worked out differences in computational procedures and that a Manual Modification by written agreement was not forthcoming. The exercise also illustrated that as far as complex hydrograph scalping methods are concerned, standard methods are desirable, but judgement normally will be required to coordinate results from different methods.

In a draft Modification Determination on November 6, 1989 I proposed to reject the Motion and suggested three avenues for further consideration: New Mexico withdraw the Motion and work with Texas to urge USGS to take into consideration the views of the states about the correct procedures; New Mexico continue to develop, in consultation with Texas, more objective and repeatable procedures; or New Mexico propose revised procedures to demonstrate that all contingencies and requirements are taken into account, including objectivity, repeatability, correctness during high runoff periods, and sensitivity to details of Rio Hondo water accounting.

In his reply dated November 27, 1989 Mr. Reynolds stated that New Mexico was willing to allow USGS to exercise professional judgement for the mechanical separation of hydrographs; acknowledged that under some conditions the storage and releases from Two Rivers Reservoir must be considered; opined that the differences in the two states' base inflow procedures were due to Texas not following agreed upon procedures; offered amended language for the motion; and requested a decision on the motion by its first anniversary, December 8, 1989.

Ms. Lynch's reply on December 5, 1989 stated that no agreement by the states seemed imminent, and recommended rejecting New Mexico's motion.

On December 8, 1989 I informed the states of my action to defer decision on the Motion to allow time to await Mr. Pascoe's reply about good cause to modify the Manual. I also raised two questions: 1) is there any result of the litigation as it regards the base inflow estimation that is different than the procedures and methods described in Texas Exhibit 68; and 2) can the states agree on a modification that instructs USGS to use the procedures in Texas Exhibit 68 subject to review by the states and the River Master. I also asked: absent agreement what would be the states' objections to the River Master amending New Mexico's motion along these lines under the provisions of Section III.C.2 of the Amended Decree.

In response to the first question Mr. Reynolds wrote on December 26, 1989 that the answer was no as long as Rio Hondo flows were not deducted. Ms. Lynch replied on January 12, 1990 that the answer was yes, because the Supreme Court had adopted Texas Exhibit 79, not Exhibit 68 and that in adopting the River Master's Manual the Court was calling for different procedures than those in TE 68.

With regard to the second question, Mr. Reynolds wrote that New Mexico had no objections to amending the Motion as long as the Rio Hondo issue was dealt with. Ms. Lynch reported that Texas would object to any amendment that required coherence with TE 68, and proposed that any approval or amendment of the motion should delete any reference to TE 68 and specify instead that USGS rely on their best professional judgement.

On January 19, 1990 Mr. Reynolds wrote proposing language that deleted reference to TE 68. Ms. Lynch responded on January 26 stating encouragement that agreement might be possible and raising questions of interpretation. Mr. Reynolds replied on January 31 with clarification and stated that he was encouraged that there existed the possibility of agreement. Ms. Lynch replied on March 13 proposing that the states jointly ask USGS to establish a gage at the mouth of the Rio Hondo to facilitate an agreement.

On March 29 Mr. White reported that Mr. Reynolds was hospitalized; and Mr. Reynolds subsequently passed away. Mr. John J. Whipple was subsequently appointed Technical Representative for New Mexico.

Mr. White replied on April 18 to Ms. Lynch's letter of March 13 stating potential agreement for installing a gage at the mouth of the Rio Hondo, providing: that a gage is also established on the Rio Hondo below Hagerman Canal, that the USGS adopt a "modified Welder Method", and that the base inflow estimates are made by a qualified person.

Mr. White wrote on June 15 and transmitted a memorandum about the base inflows that had been provided to Mr. Reynolds on December 14, 1989; and on June 18 Mr. Whipple sent a discussion of the points contained in Texas' letter of January 12 1990. On July 17 Texas wrote with a discussion of the propriety of New Mexico's submittals.

Base flow separation. In general, base flow is all flow into a stream other than direct flood flow. A discussion of the base flow concept was presented in the River Master's Modification Determination issued on November 18, 1988.

New Mexico needs assurance that true base inflows are not counted as flood flows and Texas needs assurance that all of the flood flow that was considered in Texas Exhibit 79 is credited under the River Master Manual procedure.

Previous base inflow estimation methods for Acme to Artesia have involved subtracting the Acme hydrograph from the Artesia hydrograh and scalping the remaining hydrograph. If Rio Hondo flows are all flood flows that arrive at the Artesia gage within the same time period as a main river flood, the scalping process would presumably remove them. In that case there would be no need to deduct them. If, on the other hand, they are all base flows, it would be proper to deduct them, if what is sought is the base inflow addition in the Acme-Artesia reach of the mainstem of the Pecos River.

If Rio Hondo flows are mixed flood and base inflows, the situation is more complex and requires special attention, which it has received from USGS. If the Rio Hondo flows are delayed due to reservoir regulation, or if they come in multiple peak or sustained hydrographs, the procedure requires special attention. If Rio Hondo flood flows disappear into the ground and reappear as artesian flows in the Roswell Basin, the picture is even more complex, because the Manual provides no details for accounting for these flows.

Flood flows in Rio Hondo have been a bone of contention in the past. Texas was concerned with storing flood waters of the Rio Hondo; see Pecos River Joint Investigation (PRJI) p 163 which states: "This plan was strenuously objected to by the local interests in Texas, who allege that a large part of the water which would be stored in the old Hondo Reservoir would be lost by seepage into the cavernous

limestones that underlie the reservoir and thereby impair the water supply of the Red Bluff project. The Texas interests proposed that a diversion plan be considered for the project".

There remains a controversy about whether all the flows of the Rio Hondo are flood flows or whether part of them are base flows. This controversy apparently goes back a long time. Rio Hondo flows and others were said by the PRJI to disappear into the artesian aquifer. PRJI states on page 45 ". . . From Salt Creek to Seven Rivers much of the tributary flood flow originating in the mountains on the west sinks underground in passing over the porous strata which form the intake area of the Roswell Artesian basin, or, below this, disappears in the valley fill. . ."

New Mexico and Texas do not agree about whether the Rio Hondo flows are all flood flows. In their September 27, 1988 reply to Texas' opposition to their motions to modify the manual New Mexico stated "The procedure used by USGS . . . has the effect of categorizing the perennial, or low flows, of the Rio Hondo as flood inflow." Texas' technical response, dated October 17, 1988, stated that "The flood flows of the Rio Hondo at the gage below Diamond A Dam near Roswell, New Mexico, are not perennial." This dispute over whether the flow of the Rio Hondo is flood flow or base flow is behind the persistent disagreement over methods.

Methods and data used to estimate base inflow. Texas Exhibit 68 presents a river routing study for the years 1919 through 1946. It ". . . documented the procedures followed by Texas in computing a revised 1947 Condition Inflow-Outflow Relationship. . ." (Texas Exhibit 79, page 1). The Special Master accepted the equation for calculating the

stateline departures presented in TE 68. Texas Exhibit 79 used this equation to compute departures of stateline flows from the 1947 condition in the period 1950-1983.

For base inflow TE 68 uses data from Table A-8-1, Page 8-5 and 8-6 of the 1960 Report on Review of Basic Data (Subcommittee, 1960). This data was prepared by Tipton and Kalmbach, Inc. (T&K), and presented in their "Memorandum on Pecos River Base Flows and Their Relation to Precipitation" dated September 22, 1958 (included in Appendix 8 of the RBD report). TE 79 used the same source of data for the years 1950-56 and then adopted USGS' estimates for the years 1957-1983 which were prepared for the purpose of estimating water salvage due to phreatophyte eradication. USGS used the same basic technique as described in the RBD report until 1978 when they began to try to improve their estimates by considering the details of Rio Hondo water accounting.

According to New Mexico, the Texas Exhibit 68 procedure, stemming from the T&K work, requires scalping the difference hydrograph of the Artesia and Acme daily hydrographs. An alternative to this which is used by USGS is to scalp the Acme and Artesia hydrographs separately, then to take the difference of the resulting base flow graphs.

T&K developed the base flow estimates from actual and synthetic data for the hydrographs at Artesia and Acme. Their data adjustments require nearly three pages of text to describe. There is no evidence that details of watershed accounting such as low flows of the Rio Hondo were considered. I have not found a discussion of either Texas Exhibit 68 or the RBD report about handling of Rio Hondo flows and believe tl the T&K analysis did not get down

to the fine level of detail with which USGS now analyzes base inflow additions.

The USGS water budget analysis of the effects of saltcedar removal requires a careful hydrologic budget analysis of the watershed. This is explained in Welder's 1973 and 1988 reports. Since 1978 USGS has deducted the estimated or measured low or sustained flow of the Rio Hondo from the measured flow at the Artesia gage because they apparently believe that these are flood flows, not true base flows. These could be flood flows, for example, if regulation of Two Rivers Reservoir delayed the flows until a release at some time after the flood event. The estimation of base inflows to estimate saltcedar consumption is not necessarily the same computation as an estimation of total base inflows to the Acme to Artesia reach of the Pecos River.

In a [sic] October 30, 1979 letter to S.E. Reynolds and Robert M. Whitenton, Welder stated that "twenty cfs per day was deducted from established base flow to correct for continuous inflow from Rio Hondo." This indicates that for this period, November and December, 1978, the base flow was first calculated without reference to Rio Hondo, then the 20 cfs was subtracted directly.

New Mexico provided references to discussions with USGS employees Welder and McCracken with their first motion to modify the manual (Rodke, 1988). A January 15, 1987 memo relates a discussion with Welder where he described that for seven months in 1978 and 1979 the Rio Hondo flowed for the first time in many years all the way from Roswell to the confluence with the Pecos. This seems to be a different situation than that reported in the PRJI report where it is stated that ". . . from 1890 to 1941 there were at least 47 occurrences of flood flows of sufficient volume

to discharge water to the Pecos River." In a memo dated August 14, 1987 Rodke relates a discussion with Ronny McCracken that describes the procedure USGS follows to make the base flow estimates, but the memo does not explain the use of Rio Hondo flows to serve as a guide to baseflow separation; it suggests that the flows are subtracted directly.

Further reasoning was provided in a December 4, 1987 letter from Robert Knutilla to S.E. Reynolds: "The purpose of the USGS procedure is to compute, with the best information available, values that best represent base inflow to the Acme-Artesia reach and provide that measure against which the effects of phreatophyte eradication and control can be evaluated. It has been the USGS assumption that adjusting the Artesia hydrograph for the estimated discharge from the Rio Hondo directly to the Pecos River is necessary to arrive at an adjusted value representative of actual base inflow to the reach. This assumption is based on information that the Rio Hondo is a losing stream in its lower reaches and that during periods of normal runoff no water is discharged to the Pecos River. No evaluation has been made on the Rio Hondo to determine where it ceases to be a losing stream and what the base-flow component of discharge might be about that point. Adjustments made have been based on miscellaneous measurements and observations of actual discharge to the Pecos River." This statement seems to suggest that USGS believes that all flows in Rio Hondo are flood flows.

USGS' procedures were explained further at the River Master's March 20-21, 1989 Albuquerque meeting and in a September 19, 1989 letter to S.E. Reynolds and V.K. Murthy from Russell K. Livingston of USGS who stated that "The precedent of subtracting inflow from the Rio

Hondo, established by Welder in 1978, was used as a guide to aid in drawing the base-flow separation line during extended high-flow periods that occurred in 1984-1987. For the Artesia site the shape of the base-flow curve at Acme is also considered; observations of diversion by Hagerman Canal from the Rio Hondo were also used at times." Figure 7 of New Mexico's September 29 submittal illustrates the USGS procedure. It is difficult to read the copy of the graph, but USGS apparently subtracts the Rio Hondo flows from the Artesia hydrograph before scalping; that aids in selecting the points of base flow separation. This procedure is clarified in Russell Livingston's letter of September 19, 1989. Why a similar procedure is not necessary for Rio Felix is not explained; but I infer that the difference in treatment results from the lack of storage on Rio Felix and the greater complexity of Rio Hondo.

Initially there seemed to be confusion about whether USGS simply deducted the Rio Hondo flows, but now it is apparent that they deduct the flows to aid in judging how to scalp the Artesia hydrograph. For practical purposes this has essentially the same result as a direct deduction of the flows.

Summary of reasons for determination. In rejecting the First Motion I agreed that procedures used in the River Master's Manual for determination of the annual delivery obligation should be consistent with those that were used to develop the mathematical relationship with which the determination of annual delivery obligation is made. I clarified this statement in a letter dated December 8, 1989: ". . . the Manual should be consistent with the results of litigation that fixed computational procedures to determine the annual delivery obligation." The total result

of the litigation as it is embodied in the River Master's Manual (Texas Exhibit 108) is the guide for consistency.

New Mexico has demonstrated that USGS has changed their estimation techniques and statements by USGS seem to indicate that they will continue to modify these methods in attempts to improve estimates of base inflow.

The Modification is intended to make the Manual more consistent by removing ambiguity about the criteria USGS uses to estimate flood inflow. The criteria implicit in the draft modification determination is ". . . the best available data and methods to estimate the total monthly base inflows accruing to the Acme to Artesia reach." Because each state, USGS and the River Master may have different evaluations of the best data and methods, as well as about the results of an annual calculation, the Modification provides for the states and the River Master to review USGS' estimates and for the River Master to make the final determination using the authority granted by the Amended Decree.

The states have worked hard to resolve this Motion and disputed issue. Questions about the procedure to estimate the base inflow quantities can continue to be pursued directly with USGS, through the Pecos River Commission or through the Office of the River Master, depending on the desires of the states. This can include dealing with issues such as whether gage(s) will be placed on the Rio Hondo.

In summary, this modification determination: removes any reference to Texas Exhibit 68; relies on USGS to make the annual estimation; provides the states with annual opportunities to review USGS results and methods; provides for consideration of unusual events; enables the River Master

to review USGS results and methods in the context of the states' objections and to make the initial estimate if USGS results are not furnished; and leaves the states with an opportunity to seek relief through the provisions of the Amended Decree. The states may also cooperate to conduct additional research into base inflow estimation and provide USGS with guidance for making the annual estimates.

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A-66

PECOS RIVER COMPACT

Modification Determination
New Mexico's Third Motion and Texas' Cross Motion
to Modify the River Master's Manual

December 7, 1992

Neil S. Grigg
River Master of the Pecos River
1009 Lemay, # 103
Ft Collins, Colorado 80524

No. 65, Original

IN THE
SUPREME COURT OF THE UNITED STATES

OCTOBER TERM, 1992

STATE OF TEXAS, Plaintiff,

v.

STATE OF NEW MEXICO, Defendant.

Office of the River Master: Neil S. Grigg

MODIFICATION DETERMINATION

NEW MEXICO'S THIRD MOTION TO MODIFY THE RIVER MASTER'S MANUAL

New Mexico's Third Motion to Modify the River Master's Manual, dated April 18, 1990, proposes to replace Section B.4 with new language. This Modification Determination amends New Mexico's Third Motion and also is a Final Determination on Texas' Cross Motion. The Draft Modification Determinations (DMDs) dated July 6, 1992 and November 2, 1992 present background for the determination and a list of references. They are adopted by reference as part of this Modification Determination. The Motion is amended by replacing Section B.4 of the River Master's Manual with the text of the amended motion given on pages MD-2 through MD-5 following.

/s/ Neil Grigg
Neil S. Grigg
River Master of Pecos River

CERTIFICATE OF SERVICE

I certify that on December 7, 1992 I served the Modification Determination for New Mexico's Third Motion to Modify the River Master's Manual on Paul Elliott and Peter Thomas White, Legal Representatives for the States of Texas and New Mexico.

/s/ Neil Grigg
Neil S. Grigg
River Master of Pecos River

B.4. Determination of Flood Inflows, Artesia to Carlsbad

The flood Inflows for the Artesia to Carlsbad reach are computed as the sum of the flood inflows to the Artesia to Dam Site #3 reach and the flood Inflows to the Dam Site #3 to Carlsbad reach. Monthly quantities for each item will be measured or computed, and the annual quantities will be the sum of the monthly quantities. The computational items used to estimate the flood inflows for this 45.3 river mile reach of the Pecos River are listed below, followed by an explanation of each computation to be made:

Flood Inflow, Artesia to Dam Site #3
Flood Inflow, Dam Site #3 to Carlsbad
Total inflow to the Dam Site #3 to Carlsbad Reach
    Streamflow, Pecos River at Dam Site #3
    Carlsbad Springs New Water
Total outflow from the Dam Site #3 to Carlsbad Reach
    Lake Avalon Evaporation Loss
    Lake Avalon Change in Storage
    Net Carlsbad Irrigation District Diversions
    Other Depletions
    Streamflow, Pecos River at Carlsbad
Flood Inflow, Artesia to Carlsbad

a. Flood Inflow, Artesia to Dam Site #3

Use the sum of the monthly flood flow quantities determined by hydrograph scalping of the daily USGS streamflow records for:

(1) Rio Penasco at Dayton, NM;

(2) Fourmile Draw near Lakewood, NM;

(3) South Seven Rivers near Lakewood, NM;

(4) Rocky Arroyo at Highway Bridge near Carlsbad, NM.

b. Flood Inflow, Dam Site #3 to Carlsbad

Compute the total inflow to the reach (item B.4.c.) and the total outflow from the reach (item B.4.d.). Subtract the total inflow from the reach (item c) from the total outflow (item d).

c. Total inflow to the Dam Site #3 to Carlsbad Reach

Total inflow to the Dam Site #3 to Carlsbad Reach is computed as the sum of items (1) and (2) below:

(1) Use USGS streamflow records for the Pecos River at Dam Site 3, near Carlsbad, N.M.

(2) Carlsbad Springs New Water

Use the following procedure to compute the monthly new water discharge quantities rounded to the nearest 100 acre-feet.

(a) Use the annual streamflow records (expressed in cfs) furnished by the USGS for the gaging station, Pecos River below Dark Canyon, at Carlsbad, N.M.

(b) Subtract tributary inflow from Dark Canyon Draw, furnished by USGS for the Dark Canyon Draw at Carlsbad gaging station.

(c) Subtract releases and spills from Lake Avalon which are furnished by USGS for gaging station, Pecos River below Avalon Dam, N.M.

(d) Add 2 cfs for the annual depletions from the Pecos River from the Carlsbad canal flume to the Carlsbad gage.

These depletions are caused by the power plant consumptive use, evaporation from Tansill and Bataan Lakes, and all diversions including the Carlsbad golf course, F.V. Dowling and E.J. Hines.

(e) Subtract the lagged seepage from the main CID canal in cfs which is computed to be 7 percent of the CID diversions measured at Avalon Dam by USGS for gaging station, Carlsbad Main Canal at Head, Carlsbad, N.M. This seepage will have a lagged distribution as follows: one-half in the current quarter; one-third in the following quarter; and one-sixth in the next quarter.

(f) Subtract one cfs to represent the average annual return flow from surface water irrigation between Avalon Dam and the gaging station Pecos River at Carlsbad.

(g) Subtract lagged leakage from Lake Avalon. The leakage from Lake Avalon is estimated by using the mean monthly gage height (H) in feet for Lake Avalon (published by USGS for Lake Avalon Near Carlsbad, N.M.), in the equation: Avalon leakage in cfs = 4.78 (H) - 62.0. One half of this leakage is assumed to appear at Carlsbad Springs during the current quarter; with one-third to appear during the following quarter; and one-sixth during the next quarter.

(h) Subtract 3 cfs to represent the average seepage loss from the Pecos River in the reach between Major Johnson Springs and the Dam site No. 3 gage.

(i) The annual new water in cfs is: (a) - (b) - (c) + (d) - (e) - (f) - (g) - (h).

(j) Convert the new water in cfs, item (i) above, to units of 1000 acre-feet, and distribute equally to each month of the year.

d. Total outflow from the Dam Site #3 to Carlsbad Reach

Total outflow from the Dam Site #3 to Carlsbad Reach is computed as the sum of items (1) through (5) below:

(1) Lake Avalon Evaporation Loss

(a) Compute the monthly evaporation loss by multiplying the monthly net evaporation rate times the average monthly surface area for Lake Avalon.

(b) Use the USGS elevation, area and capacity relationship for Lake Avalon to estimate the average monthly surface area for the lake. The 1982 area-capacity table based on the 1979 United States Bureau of Reclamation (USBR) sediment survey for Lake Avalon (Table 3) is to be used until a revised area-capacity table based on a new sediment survey performed by the USBR, the U.S. Army Corps of Engineers, USGS, U.S. Soil Conservation Service or a state-registered engineer is available.

(c) For Lake Avalon evaporation and precipitation, use U.S. National Weather Service (USNWS) evaporation and precipitation data for Brantley Dam. When the U.S. National Weather Service data are not available, use USBR evaporation or precipitation data for Brantley Dam. If neither USNWS nor USBR precipitation data are available, use precipitation data from Carlsbad or Carlsbad Federal Aviation Administration Airport in that order.

(d) Missing monthly evaporation data at Brantley Reservoir are to be computed using the following equation:

$$E_L = 2.5*[(p*T/100)*(114-H)/100] - 1.5$$

where E_L is the lake evaporation in inches, p is the percentage of daytime hours at the approximate location of Avalon Reservoir, as given in the table below; T is the

mean monthly temperature in degrees F, average of Artesia and Carlsbad; H is the average percent humidity for the month computed from the data at 5AM, 11AM, 5PM and 11PM furnished by the National Weather Service.

Table of Percentage of Daytime Hours for Avalon Reservoir

January	7.17	July	9.80
February	6.95	August	9.29
March	8.36	September	8.34
April	8.76	October	7.92
May	9.65	November	7.08
June	9.62	December	7.02

If Brantley Reservoir evaporation data are not available, and humidity data at Roswell and other data are not available for estimating evaporation at Lake Avalon, and there is not more than one month missing between months for which data are available, estimate the evaporation by interpolation between monthly data. If complete evaporation data are missing for more than one month and data for all the above described methods are not available, find the average daily evaporation that is published for that month and estimate total evaporation by multiplying the average daily evaporation times the number of days in the month.

(e) Monthly net evaporation in feet for Lake Avalon is determined by multiplying pan evaporation in inches by 0.77 to determine monthly lake surface evaporation, subtracting the monthly precipitation in inches, then converting to feet by dividing by 12.

(2) Lake Avalon Change in Storage

Use data from USGS gage height records for Lake Avalon near Carlsbad, N.M., and gage height-area-capacity relationships shown in Table 3.

(3) Net Carlsbad Irrigation District Diversions

Use 93 percent of the USGS published records for the gaging station, Carlsbad Main Canal at Head, Near Carlsbad, N.M.

(4) Other Depletions

For other depletions referenced in B.4.c.(1)(d) add 100 acre-feet for all months except July and August and 200 acre-feet for July and August.

(5) Streamflow, Pecos River at Carlsbad

Use the USGS gaging station records for Pecos River below Dark Canyon, at Carlsbad, N.M., minus the gaged streamflow at the USGS gaging station, Dark Canyon Draw at Carlsbad, N.M.

In 1970, the USGS discontinued the gaging station Pecos River at Carlsbad, N.M., and moved it to a new site about 0.8 mile downstream. The new "Carlsbad gage" was renamed Pecos River below Dark Canyon Draw and it now measures tributary inflow from Dark Canyon Draw that was not previously measured at the Carlsbad site. The total flow of Dark Canyon must be subtracted from the total flow Pecos River below Dark Canyon Draw in order to arrive at the equivalent total flow at the old location at Carlsbad.

(e) Flood Inflow, Artesia to Carlsbad

Add items (a) and (b) above.

Modification Determination
New Mexico's Third Motion and Texas' Cross Motion to Modify the Manual

GROUNDS FOR DETERMINATION

December 7, 1992

Summary

New Mexico's Third Motion was filed on April 18, 1990. The last Draft Modification Determination proposed to adopt the tributary method, and both states have agreed with this proposal. Texas has agreed to defer consideration of the salvage water and shortfall routing issues to the future. New Mexico objected to the proposal to extend a net credit of 2.5 TAF to Texas, and this Final Determination adopts New Mexico's recommendation to remove the credit. Although Texas does not receive the credit, both states should benefit from this action because the causes of potential disputes have been removed, including a numerical error in the 1988 Final Report.

General Background

The background for the Motion was described in the Draft Modification Determinations (DMDs) dated July 6, 1992 and November 2, 1992, which are adopted by reference as part of this Modification Determination (MD). The states responded to the November 2, 1992 DMD on November 20, 1992.

The November 2, 1992 Draft Modification Determination

The DMD dated November 2, 1992 proposed to adopt the tributary method. Computations were to be referenced

back to water year 1990, with the exception of proposed bank storage credits for water years 1988 and 1989 when I withheld the B.4.i.(2) bank storage credit. Considering this credit and others, final resolution of credits in the Third Motion was proposed to be a flood inflow credit to Texas of 2.5 TAF, to be credited in Accounting Year 1993. Texas' concern about accuracy of tributary gages had been addressed through a response from USGS. All issues raised by the states had been considered and discussed, although issues remained where the states might choose to negotiate among themselves.

Texas' Response to the November 2, 1992 DMD

Texas made the following points in their response dated November 20, 1992:

Texas agreed to accept the conceptual approach of the DMD with two conditions: that the accuracy of the gages used in accounting be examined and verified, and that they reserve the right to file future motions to correct any problems identified with the procedure. The first condition was satisfied by USGS' response, and the second refers to future years.

Texas agreed to defer consideration of the salvage water issue and shortfall routing to the future. On shortfall routing, Texas clarified their position on issues discussed in the DMD having to do with New Mexico's obligation to deliver at the state line.

Texas furnished text for the method to estimate missing evaporation. Texas' suggested text has for the most part been adopted. New Mexico also suggested that the method for estimating missing evaporation data be retained.

New Mexico's Response to the November 2, 1992 DMD

New Mexico agreed with the adoption of the tributary method, which they proposed in the first place.

New Mexico made two suggestions for clarification to the Modification Determination, and they have been accepted.

New Mexico suggested that the current text for estimating missing evaporation data be included in the Manual. Texas made a similar suggestion, and Texas' suggested text has for the most part been adopted. The use of the 5 p.m. humidity record, along with 5 a.m., 11 a.m. and 11 p.m., has been adopted because omitting it appears to have been a clerical error in the Manual.

New Mexico suggests that if data are missing, the procedure can be used by New Mexico when furnishing evaporation data to the River Master. I encourage New Mexico to do this whenever data are missing. This will save time during the annual accounting.

On page 2, New Mexico suggested that the last paragraph in Section B.4.e of the DMD be either revised or deleted. I have accepted the suggestion to delete it, as explained later. New Mexico then presented detailed reasons and positions on the different aspects of flood inflow credits that were considered in the Third Motion process. These credit items and New Mexico's positions are discussed in the next section.

New Mexico's Response concludes with recommendations on pages 38 and 39. These recommendations deal with the issue of credits, discussed in the next section. These credits include the arithmetic errors which were reported to me during the Third Motion process.

New Mexico also recommends that the flood inflows for water years 1990 and 1991 be recomputed to enable accurate accounting for water year 1992, considering the averaging process. This recommendation follows logically from the Third Motion determination, and will be implemented during Accounting Year 1993.

As discussed in the next section, my decision on credits is to adopt New Mexico's suggestion to remove them.

Reanalysis of Credits

In the Grounds to the November 2, 1992 DMD, I considered and discussed the following claims for credits:

1. The B.4.i.(2) credit for BBS. I proposed to credit Texas with 9.7 TAF in FIF for the BBS that accumulated during 1988 and 1989.

2. Credit to New Mexico for a numerical error in the 1988 Annual Report. The states did not agree about this credit, and I removed it from the November DMD proposal with the expectation that the states might negotiate about it and use it as a context to establish guidelines for any future clerical errors.

3. Potential credit to New Mexico for the issue of year-to-year fluctuations in channel losses. This issue related to water years that occurred prior to the filling of Brantley Reservoir. The fluctuations occurred due to the channel loss equation in the Manual procedure, which is considered as a Court-approved procedure for the years in question.

4. Credit to New Mexico for Water Years 1990 and 1991, following the principle that adjustments go back to Water

Year 1990. I proposed a credit of 7.2 TAF to New Mexico after recomputing Water Years 1990 and 1991.

New Mexico raised an additional claim for credit because USGS deducted Rio Hondo flood flows during water years 1987-1990 (page 20-21). This issue refers to New Mexico's Amended First Motion which was decided in December 1990, and is outside the realm of the Third Motion process.

In the November DMD, the proposed credits were 9.7 TAF to Texas for B.4.i.(2), and 7.2 TAF to New Mexico for the adjustment for 1990-91, making a net credit to Texas of 2.5 TAF.

New Mexico's (November 20, 1992) arguments against the provision of a bank storage credit to Texas are (summarized from page i):

1. The credit is technically invalid because an improper water balance was used and unverified assumptions were used.

2. The credit is legally erroneous because it is an unauthorized retroactive adjustment.

3. The credit is inequitable because it corrects some shortcomings without correcting others.

4. The River Master has the obligation and authority to correct arithmetic mistakes.

After reviewing these arguments, parts of which had been raised earlier and were discussed in the November 2, 1992 DMD, my conclusions are as follows:

1. The allegation of an invalid water balance was discussed on page GR-3 of the DMD and at the September meeting. The RMM states in B.4.b.(3) to use 8200 acre-feet

for Major Johnson Springs New Water. The RMM does not distinguish between recharge and discharge. The difference between these items is recognized in the November 2, 1992 DMD, and can be seen from the diagrams and equations in the July 6, 1992 DMD. I rejected New Mexico's suggestion that the flood inflow for 1988 and 1989 be recomputed using the Third Motion procedure. The difference between the two procedures was very small anyway.

2. The legal aspects of retroactive adjustments are outside my sphere of authority. On the basis of the Third Motion procedure, I have tried to be consistent in stating that the Brantley Bank Storage water budget item would be credited as soon as the procedures were available, and I do not consider this to be a retroactive adjustment of a Final Determination; rather I consider it a logical way to handle a procedural problem that was recognized at the time Brantley was filled. I anticipated that a fair solution would be worked out during the Third Motion process.

3. I considered issues of equity in the November 2, 1992 DMD, and my response about credits reflected my conclusions about the equity of the different claims for credits. My decision was not to consider New Mexico's claim for adjustments due to the year-to-year fluctuation issue for water years 1987-89 because final determinations for those years were based on official procedures in the RMM at that time. The issue of credits due to USGS' technique for analyzing Rio Hondo has not been considered in the Third Motion because that issue was considered in the Amended First Motion which was decided in December 1990. The other equity issue raised by New Mexico, the arithmetic error, is covered next.

4. New Mexico argued that I have the obligation and authority to correct the 4.7 TAF arithmetic mistake contained in the 1988 Final Report. New Mexico describes the origin of this error correctly on pages 32 and 33. Because this was the first accounting year under the Amended Decree, and the computer procedures were new, the states had no opportunity to detect the arithmetic error because the spreadsheet setup was revised after the Preliminary Report had been reviewed. After learning of this error, I stated an intention to have it corrected. In the DMD dated July 6, 1992, I stated (page GR-7): "During the Third Motion process it also became clear that additional adjustments might be needed in the interests of equity. These are a 4.7 TAF adjustment for an AY 1988 accounting error that was identified in the Third Motion process and an adjustment of 7.2 TAF to compensate for the two years of interim procedures for computing MJS. . . . By this action I am definitely not seeking to open the way to adjustments to Final Reports after the determination has been made."

After the states responded to the July 6 DMD, I removed the proposed credit in the November 2, 1992 DMD with the statement (page GR-6): "Credit to New Mexico for a 4.7 TAF spreadsheet error in FIF that was in the 1988 Annual Report is not provided. The states did not agree about that credit at the September meeting, but left open the possibility that they could negotiate it at any time in the future, and they could then inform the River Master and credit would be provided."

After reviewing New Mexico's final comments on the November 2, 1992 DMD, I agree that the arithmetic error should be corrected. I see no reason to leave the error in

place, for the reasons that I will state in the following paragraphs.

My final determination about credits is based on several principles and conclusions resulting from the Third Motion process.

First, I do not seek to initiate a precedent for making retroactive adjustments to final determinations. The states can, however, agree on any matter, and I am bound to accept it. This is the logical avenue for any adjustments to delivery obligation. Thus, by not providing any statement of credit to one state or the other, the issue of retroactive adjustments is removed from the Modification Determination.

However, in considering the adjustments that are needed as a result of the Third Motion process, I have weighed the equity of the claims for credit that are summarized above, and my decision to remove the proposed credit from the MD is based on my conclusion that after weighing these claims, they balance each other out within the bounds of accuracy of estimating the water budget items.

The credits referred to begin with the credit to New Mexico for the computations for Water Years 1990 and 1991. Based on the principle that accounting is referred back to water year 1990, I believe that it is fair to extend the 7.2 TAF credit to New Mexico. The method for using existing Manual procedures to estimate MJS for those years was thoroughly explored, and found to be infeasible. This is documented in the Final Reports for those years and in the Third Motion documents.

Based on my consistently stated intention to provide the 1988-89 bank storage credit to Texas, I believe that it is fair to extend the bank storage credit. However, after

noting New Mexico's extensive technical arguments about the validity of the water balance and assumptions about aquifer characteristics, I agree that we cannot know with precision the exact amount of bank storage. While we cannot know the exact amount, Texas is clearly entitled to some bank storage. It has been my impression from the use of a minimal value for storage coefficient that the bank storage quantities proposed were probably on the low side of the true values. In any event, we know enough about the quantity to know that it is significant, and I believe that we can estimate its magnitude closely enough to recognize the credit.

Finally, I believe it is equitable to correct the arithmetic error. My position in the November 2, 1992 DMD was not intended to withhold the credit from New Mexico, but to remove the issue from the Third Motion process. There is a difference between this kind of error, which is easily identified and corrected, and alleged errors which involve disputes between the states and technical questions without clear answers. I consider this arithmetic error to have been a one-time occurrence, it clearly occurred, and if it had been brought to my attention earlier, I would have sought an avenue to correct it, probably through agreement of the states. I hope that no further errors of this kind occur, but if they do, I will seek to work with the states to correct them in an equitable manner.

The credits balance out essentially to zero. This is because the 7.2 TAF for New Mexico and the 9.2 TAF for Texas net to 2.5 TAF for Texas, and when the 4.7 TAF for New Mexico is added back in, the net swings to 2.2 TAF of flood inflow for New Mexico. This small quantity is equivalent to about 1.5 TAF of delivery obligation, or less than 0.5%

of the 378.8 TAF total delivery obligation for the years in question, 1988-1991.

Whereas my November 2 proposal was to include the credit statement in the MD, I have now accepted New Mexico's suggestion and removed it.

By netting these credits out, including the arithmetic error, and adopting New Mexico's suggestion to delete the proposed 2.5 TAF credit to Texas, three things are accomplished. First, the technical disputes about aquifer characteristics and water balances are bypassed. Second, the issue of retroactive credits is bypassed because none are provided in the MD. Finally, New Mexico's claim to correct the arithmetic error has been addressed, and there should be no reason for further dispute about the arithmetic error.

It is fortuitous that the credits balance out about to zero and that the issue of retroactive credits can be bypassed. While I have taken advantage of this situation to remove the credit and bypass the retroactive adjustment issue for the time being, I have weighed the equity of the claims for credits and considered them in the Final Determination. I believe that this weighing of credits during a motion process is necessary to deal with the issue of consistency, and it may recur in the future. If it does, the states can consider for each such case how any potential credit issue should be handled.

This is a Final Determination about Texas' claim for a B.4.i.(2) credit for BBS, New Mexico's claim for credit for a spreadsheet error in the 1988 Annual Report, and New Mexico's claim for credit to adjust for Water Years 1990 and 1991. Although by this action Texas does not receive the 2.5 TAF bank storage credit, I believe that both Texas

and New Mexico benefit from this action by the removal of causes for future disputes over retroactive adjustments.

REFERENCES

References from April 18, 1990 to July 6, 1992 are listed in the July 6, 1992 DMD. References from July 7, 1992 through November 1, 1992 are listed in the November 2, 1992 DMD. Additional references are:

River Master, Draft Modification Determination, New Mexico's Third Motion and Texas' Cross Motion to Modify the River Master's Manual, November 2, 1992.

New Mexico, Comments in Response to Texas' October 28, 1992 Letter Regarding Brantley Reservoir Bank Storage, November 2, 1992.

New Mexico, New Mexico's Comments on the Fourth Draft Modification Determination on the Third Motion, November 20, 1992.

New Mexico, New Mexico's Reply to Texas' Response to the Third Draft Modification Determination on New Mexico's Third Motion, November 20, 1992.

Texas, Texas' Response to the River Master's November 22, 1992 Draft Modification Determination on New Mexico's Third Motion and Texas' Cross Motion to Modify the River Master's Manual, November 20, 1992.

NO. 65 ORIGINAL

IN THE
SUPREME COURT OF THE UNITED STATES
OCTOBER TERM, 1987

STATE OF TEXAS

Plaintiff,

v.

STATE OF NEW MEXICO,

Defendant,

THE UNITED STATES OF AMERICA,

Intervenor.

CHARLES J. MEYERS, SPECIAL MASTER
REPORT
November ___, 1987

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I

INTRODUCTION

In July, 1986, I filed a Report in this case proposing findings, conclusions and a decree that would bring an end to this litigation, at least for the time being. But I also expressed concern that the case would be back in court before long, for two reasons: (1) New Mexico would have difficulty in repaying, in water, the 340,100 acre feet I found she owed Texas, and (2) disputes over future deliveries would wind up in litigation, since the Pecos River Commission could not be expected to be any more effective in the future than it had been in the past. To solve these problems, I suggested that the Court might wish to consider a judgment for money damages to remedy past shortfalls and the appointment of a River Master to administer the decree in the future. Both suggestions were adopted, and the case was remanded to me to consider the question of remedy and "to recommend an amendment to the decree, specifying . . . the duties of the River Master and the consequences of his determinations. Any other suggestions for amendments should also be called to our attention." 107 S.Ct. 2279, 2287 (1987). I have set the remedies question for trial in February of 1988. By agreement, the parties have included in the issues to be tried the shortfall, if any, for the period 1984 through 1986. Those three years will be tacked on to the administrative period of 1950 through 1983, which was the subject of this Court's decision on June 8, 1987.

This Report addresses the regime that will govern the river from 1987 forward. More particularly, it recommends an Amended Decree which, in addition to enjoining New Mexico to comply with her Article III(a) obligation, provides for the appointment of a River Master, sets forth the

River Master's duties and powers and the consequences of the River Master's determinations, and incorporates the Pecos River Master's Manual to guide the River Master in performing his or her duties. Before turning to specific points in the proposed Amended Decree and the Manual, I draw to the Court's attention the desirability of appointing a River Master and entering a decree this Term of Court, despite the press of other business. Water year 1987 will be the first year at which the new regime applies. Under the proposed Amended Decree, the River Master will make his determinations for water year 1987 in 1988, and New Mexico must satisfy any shortfall for 1987 by March 31, 1989. Adherence to this schedule will best be accomplished by having a River Master in place as early as possible in 1988. This suggests a hearing on exceptions to this Report this Term, if at all possible. The proposed Amended Decree presumes that it will take effect in 1988.

II

THE PROPOSED AMENDED DECREE

It is my recommendation that the proposed Amended Decree replace the June 8, 1987 Decree set forth in 107 S. Ct. at 2287, so that a complete charter for the enforcement of the Court's judgment is available in one place for the River Master. The proposed Amended Decree includes, of course, the substance of the Court's June 8, 1987 Decree.

Several components of the proposed Amended Decree deserve brief comment. Since the data required for the calculation of New Mexico's delivery obligation for a given year are not available until the year following, the

Amended Decree directs the River Master to make determinations for a particular "water year" in the following year, termed the "accounting year." If, in the accounting year, New Mexico is found to have fallen short of her delivery obligation, the Amended Decree allows her through March of the year following the accounting year to make up the deficiency. New Mexico objects to this provision and proposes instead that she be allowed to accumulate credits and shortfalls year to year and be deemed in default only when total accrued shortfalls exceed thirty percent of her delivery obligation for any five-year period, and then only to that extent. She offers several arguments in support of this proposal.

First, New Mexico takes the position that, since the flow of the Pecos is highly variable, she may be asked to bear heavy delivery burdens at large economic cost. She argues that such costs would be unnecessary if the delivery obligation was smoothed out over a longer period than the yearly delivery requirement contemplated in the proposed Amended Decree. I am not persuaded. While it is desirable to avoid unduly heavy delivery requirements, a 30% rule measured over a five-year accounting period creates unacceptable risk, in my view. The probabilities are very high that New Mexico would fall farther and farther behind in her III(a) obligation over time. A review of Table 2 in Texas Exhibit 79 (p. 5) shows mounting deficits over time despite intermittent positive departures. Under her proposal, it seems very likely that early in the administration of the decree – indeed, quite possibly at the end of the first five years – New Mexico would be in debt for 30% of other accumulated Article III(a) obligation. On the average, for the period 1950-1983, she was in default by 10,000 acre feet per year. So long as the principle

survives that New Mexico owes water to Texas under the Compact, the only sure, or even probable, way of honoring that principle is to make the delivery obligation an annual one. The Court has clearly indicated that the remedy of money damages, if appropriate at all, is an extraordinary, one-time solution to an exceedingly difficult remedial problem and that future performance is to be in kind. 107 S. Ct. at 2285-86.

Second, New Mexico argues that the Court recognized in its June 1987 opinion that it was impracticable to expect New Mexico to satisfy shortfalls on an annual basis. As evidence thereof, New Mexico cites language in the opinion to the effect that "shortfalls or credits will be reflected in [New Mexico's] later delivery obligations." 107 S. Ct. at 2287. New Mexico urges that her proposal for accumulation of credits and shortfalls is consistent with this language. I do not read the language as intending to suggest that New Mexico should not be required to keep herself current. Such a reading is completely at odds with the Court's view that in the future, Texas should receive its water. The Court had before it a clear example of the pitfalls of accumulation – a debt so large that payment in water could be exceedingly difficult.

Finally, New Mexico argues that even if she holds man's activities to the 1947 level, there will still be negative departures from the 1947 condition that are properly attributable only to "the vagaries in the flow of the Pecos River." As support for this proposition, New Mexico cites the fact that the 1947 condition curve itself, Figure 1 of Texas Exhibit 68 (p. 3), represents a number of scattered points, none falling exactly on the curve and all reflecting man-made uses at the permissible 1947 level. In the

future, the argument goes, we can expect similar departures from the curve without changes in man's activities. To be sure, the curve is not an exact representation of the scattered points it seeks to define. But it is the law of the case. Nearly four years ago, my predecessor concluded that "the curve of relationship shown by Texas Figure 1 on p. 3 of Texas Exhibit 68 and the accompanying Table 1 on p. 4 correctly quantify the obligation of New Mexico to Texas as the same is stated in Compact Article III(a), as implemented by the Master's decision of August 13, 1979, and approved by the Supreme Court in its decision reported at 446 U.S. 540." Report and Recommendation, filed 2/27/84, at p. 13. This conclusion was approved by the Court. 467 U.S. 1238 (1984). Even if the point was not settled, I see no other way to administer this Compact. The 1947 condition, as defined in these proceedings, has to be translated into a water quantity to provide a numerical standard for measurement of compliance, and this necessarily involves a margin of error. I might add that the margin of error here is not one-sided: Texas suffers equally when the curve errs on the side of understating the Article III(a) obligation. Tr. pp. 44-46, 61 (10/15/87).

The proposed Amended Decree affords New Mexico maximum flexibility in determining how to satisfy any shortfall. The state is given the opportunity, with respect to each year of shortfall, to submit a plan as to how she will remedy the shortfall. The plan must identify the source of the make-up water and specify a delivery schedule so that satisfaction of the shortfall can be verified, but New Mexico is given the freedom to determine the sources of the make-up water and (within certain limits) the timing of its delivery. Moreover, those determinations may change from year to year as circumstances vary. New Mexico is

not seriously constrained by Article IX of the Compact, which requires application of "the principle of prior appropriation within New Mexico": with or without this provision she would have been compelled to honor intrastate priorities in providing the water to satisfy Article III(a). But she remains free to buy, lease or otherwise obtain the necessary water, so long as priorities are not disturbed.

The Amended Decree anticipates that satisfaction of any shortfall will be determined by means of the procedures and equations set forth in the Manual. In other words, a calculation will be performed using the Manual to determine the amount of water that can be presumed to arrive at State line as a result of the specific actions proposed by New Mexico. If that amount equals the amount of the shortfall, New Mexico's actions will be deemed to satisfy the shortfall. Given the fungibility of water, this was thought to be the best way of ensuring that State line flows are actually increased by the amount of a shortfall, while still allowing New Mexico to engage in private ordering to satisfy the shortfall. Any arrangement which contemplates simply gauging the flow at State line to verify delivery of make-up water is unworkable. No physical means of distinguishing make-up water from III(a) obligation water exists: calculations alone can make the distinction.

The River Master's duties are set out in some detail on the Amended Decree. Unless and until a change is proposed in the Manual, the River Master's function is largely ministerial, although some judgment may be required from time to time in the selection of numerical values. The need for sound judgment will arise when one party seeks to modify the Manual without the concurrence of the other party. The Amended Decree does not empower

the River Master to initiate changes in the Manual. It was thought to be more cost effective to leave the initiative to the parties, since their experts will have to evaluate a proposed change in any event. Moreover, there is no need to incur the risk of a bureaucratic build-up in the name of research in the office of the River Master. On the other hand, the River Master is correctly delegated the power to decide in the first instance the propriety of proposed but contested changes in the Manual. For the most part, these proposed changes are likely to raise technical issues of hydrology or statistics, as to which the River Master will have expertise. Because of that expertise, the recommended standard of review is whether the River Master's findings or conclusions are clearly erroneous. Of course, a change agreed to by both parties, whether proposed through the Pecos River Commission or directly to the River Master, is binding.

Finally, the Amended Decree recommends the dismissal of the United States from this action without prejudice. At the request of the Solicitor General, the United States was excused from participation in the proceedings at an early stage. I informed the Solicitor General of my intention to recommend dismissal and he interposed no objection in his written reply.

III

THE PECOS RIVER MASTER'S MANUAL

The parties have agreed on all of the provisions in the Manual except one – the provision dealing with the accounting for depletions caused by McMillan Dike. In addition, New Mexico objects to the absence from the Manual of provisions which she contends would have

required a separate determination of the depletions resulting from man's activities in New Mexico. At a hearing on October 15, 1987, evidence was presented on these two issues and, following the hearing, post-hearing briefs were submitted. Based on the evidence and argument, I find that New Mexico should not be charged for the salvage accomplished by the Dike in the past which will be continued in the future upon the completion of Brantley Reservoir. I have also concluded that removal of references in the Manual to man's activities was entirely appropriate. Submitted with this Report is Texas Exhibit 108, which incorporates the agreements of the parties and my findings with respect to the disputed issues.

A. Brantley Reservoir and McMillan Training Dike.

As set forth in my July 1986 Report, the McMillan Training Dike was constructed in 1954 for the purpose of reducing leakage from McMillan Reservoir and was successful in doing so. The Report recommended that New Mexico not be charged for the salvage accomplished by the Dike, and the Court accepted that recommendation. July 1986 Report, pp. 11-22, 31. Brantley Reservoir will replace McMillan Reservoir and is expected to be completed in 1988. When that occurs, McMillan Dam will be breached and the Dike will no longer serve any function except in cases of extreme flood. Tr. 40-42 (10/15/87).

Texas argues that since water will no longer be salvaged by the Dike once McMillan Dam is breached, the Manual should provide for the elimination of the credit to New Mexico at that time. I think this argument misapprehends the basis for the credit. The flood in the winter of 1941-42 washed away natural sealing materials in

McMillan Reservoir and left caverns and crevices in its east side, through which large quantities of water escaped. The 1947 condition reflected those losses. When the Dike was completed in 1954, the losses were reduced, but the inflow-outflow equations then in effect did not take account of this change in the 1947 condition. When the Pecos River Commission agreed in 1961 to credit the salvage, it authorized a change in the 1947 condition. That change was quantified by the Commission itself for the period 1950-1961, when it agreed that the savings were 48,000 acre feet. For the period 1962-1983, there was no agreement by the Commission on the quantity in acre feet that was salvaged, but Texas herself, through the testimony of an expert, Dr. V.R. Krishna Murthy, established an equation for calculating the savings for the later period. Dr. Murthy's calculation showed savings of 27,600 acre feet, which I proposed be credited to New Mexico. July 1986 Report, pp. 21-22. The Court adopted the recommendation. Thus, Dr. Murthy's equation became part of the Manual, and I have concluded that it should remain a part of the Manual.

The testimony of New Mexico's State Engineer, S.E. Reynolds, at the October 16, 1987 hearing was not at odds with this conclusion. While Mr. Reynolds agreed that the Dike would no longer serve the physical function of impeding losses from McMillan after the dam is breached, he did testify to his understanding that the Commission changed the inflow-outflow equation to reflect its decision not to charge New Mexico with the salvage accomplished by the Dike. Tr. 70-75 (10/15/87). Whatever the Supreme Court may have decided about the 1947 condition in 1984 when it approved the Special Master's conclusions regarding Figure 1 of Texas Exhibit 68, the Court decided in 1987

that the salvage accomplished by the Dike should not be charged to New Mexico, presumably for the reason advanced in my Report (pp. 11-22) that the 1947 condition was modified by action of the Commission. Since the Commission's action provides no reason to distinguish between the 1950-1983 period and the 1987-forward period, the Texas contention is rejected.

B. Depletions Attributable to Man's Activities.

In its post-hearing brief, filed October 27, 1987, New Mexico argues strenuously, as it did at the October 15, 1987 hearing, that certain of the departures from the 1947 condition are due to the vagaries of the flow of the river and not to man's activities in New Mexico. As with its 30% proposal for administering the Compact, New Mexico's argument is that the 1947 condition curve is not completely accurate in representing the 1947 condition, and thus New Mexico should not be held responsible for departures from the curve absent a determination that the departures are due to man's activities. (New Mexico presents this proposal as an alternative to its 30% proposal. She contends that one or the other is necessary to address the problem of the erratic flow of the river.)

New Mexico realizes that this argument is a direct attack on the findings and conclusions recommended in my July 1986 Report and adopted by the Court in June 1987. I stated in my Report that I accepted the testimony of Dr. Murthy that his equations, as embodied in Texas Exhibit 79, accounted for all the natural losses in the system and that the remaining losses were thus attributable to man's activities. I am not prepared to reconsider this issue, although I recognize that a change in physical

circumstances my provide a basis in the future for an application by New Mexico to the River Master, the Pecos River Commission, or the Court for a change in the inflow-outflow equation. For example, in his testimony on October 15, 1987, Mr. Reynolds hypothesized a sudden increase in channel losses from one year to the next of 20,000 acre feet, owing to proliferation of salt cedars and deterioration of the channel. Tr. 53-56 (10/15/87). I suggested that such a change would require modification of the Manual and the witness seemed to agree. *Id.* at 55.

The inflow-outflow equation is not a formulation by an Einstein of an immutable law of physics: it expresses a relationship between inflows to the river and outflows at the state line, taking account of various natural losses before imputing the outflow that would have occurred under the 1947 condition. a flood like that in the winter of 1941-42 or a plague of salt cedars may require changes in the equation. With the Amended Decree in place and the River Master in office, a mechanism is available for making appropriate changes. I reject completely the notion that every year the River Master must determine the level of man's activities and their effect on the river's flow. If Dr. Murthy is correct, as I believe him to be, the task is as unnecessary as it is impossible.

New Mexico also objects to the deletion from Texas Exhibit 108 of language which was included in Texas Exhibit 108 and which related to the determination of the total depletions resulting from man's activities. New Mexico argues that Texas should be precluded from changing its theory of accounting at this late date. I am confident that Texas Exhibit 108 reflects no such change, and thus I reject New Mexico's argument.

During my service as Special Master, Texas has consistently taken the position that the calculations prescribed in Texas Exhibits 68, 79, and 108 account for all natural depletions of the stream so that any residual departure from the 1947 condition can be presumed to be the result of man's activities. It is true that Texas Exhibit 108 was submitted after Texas was informed that I had accepted her accounting theory, and yet it included provisions calling for a determination of depletions resulting from man's activities. Texas explains the inclusion of these provisions as nothing more than a contingency in case the Court refused to accept its theory and instead required a separate accounting I accept this explanation as entirely rational and credible. Furthermore, I do not believe that New Mexico was misled by the presence of the language in Texas Exhibit 108. New Mexico has known at least since March 18, 1986, when my Draft Report was circulated, that in my view Dr. Murthy's equations account for all natural losses, leaving residual losses to be attributed to man's activities in New Mexico.

The proposed Amended Decree and the Pecos River Master's Manual are submitted with this Report, and they incorporate the proposed findings and conclusions stated above.

Denver, Colorado, November ....., 1987.

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Charles J. Meyers
Special Master

[Proposed Amended Decree And
Pecos River Master's Manual Are Omitted]